THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXIV. No. 1901.] LONDON, OCTOBER 17, 1899. [51ST YEAR. PRICE 6d.

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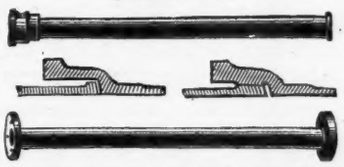

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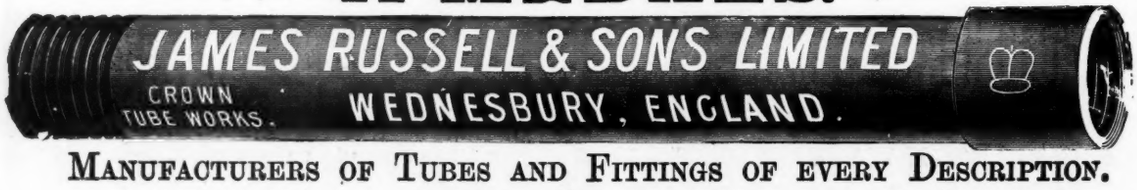

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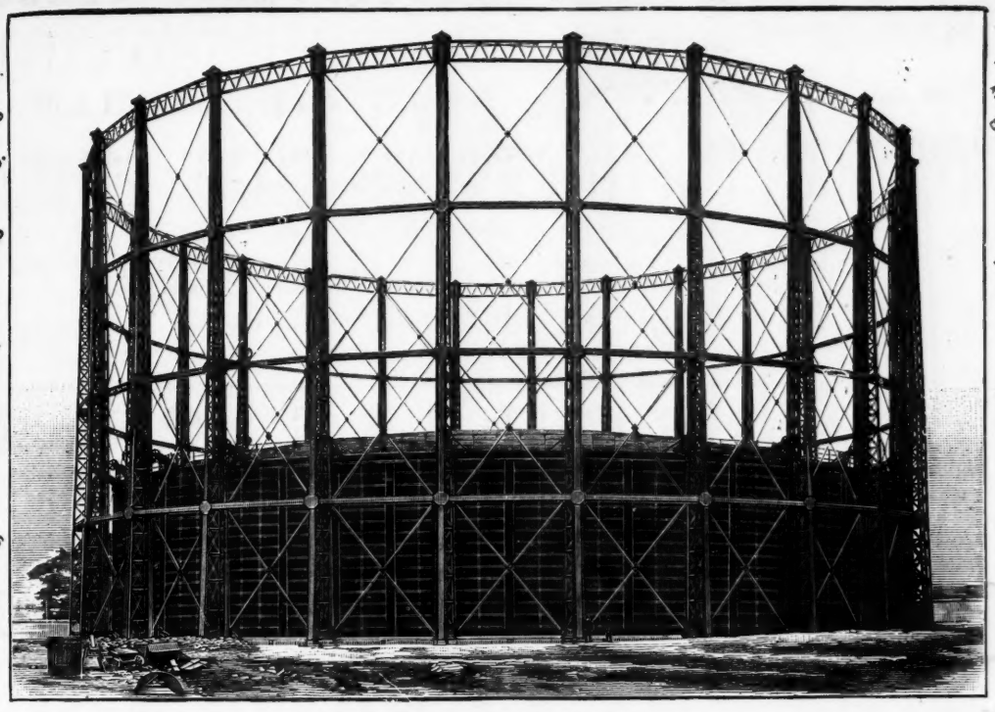

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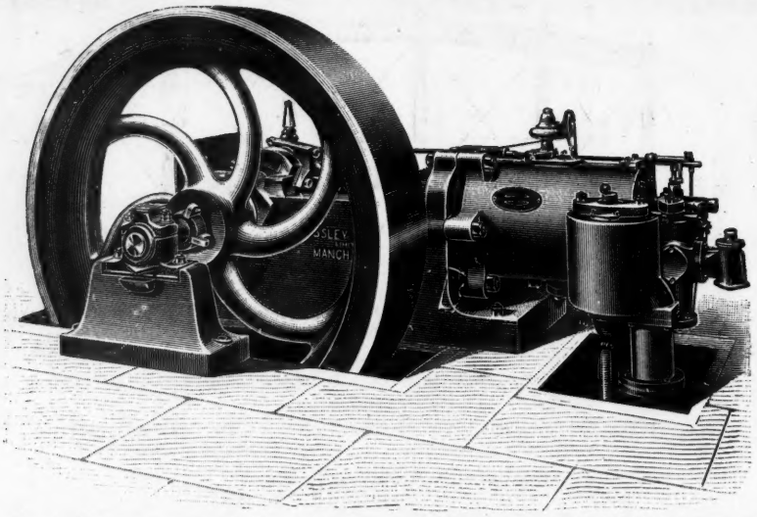

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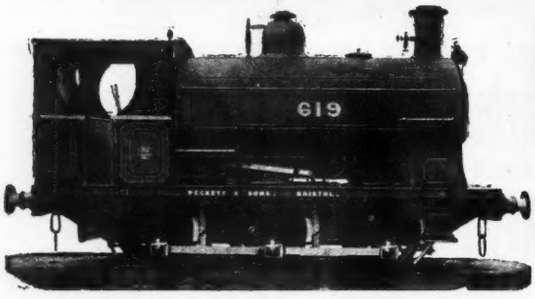

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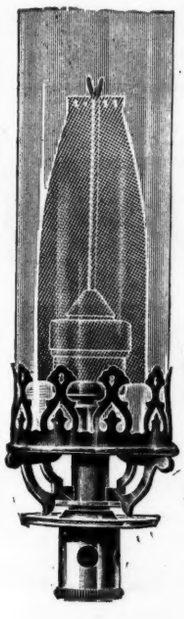

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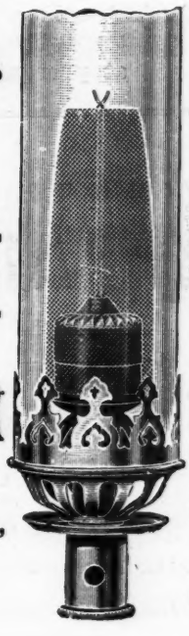

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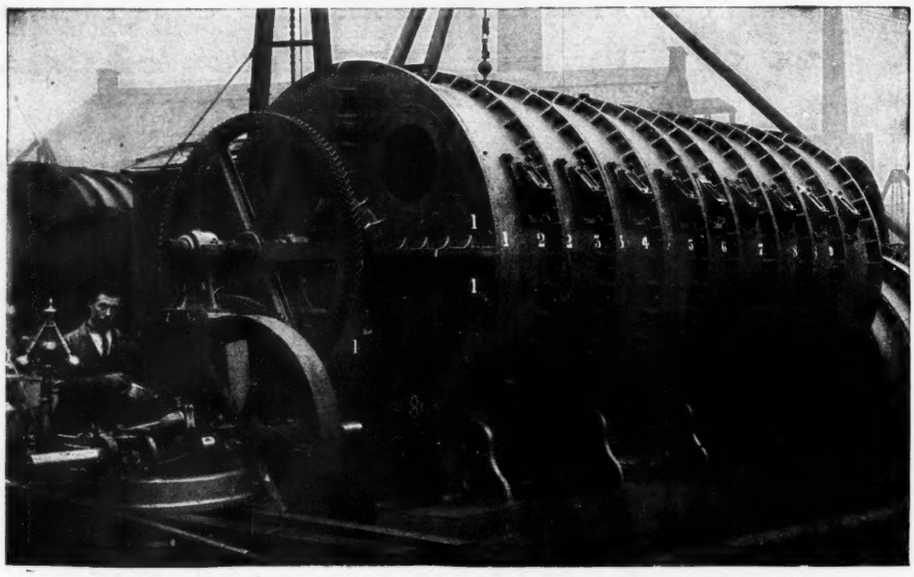

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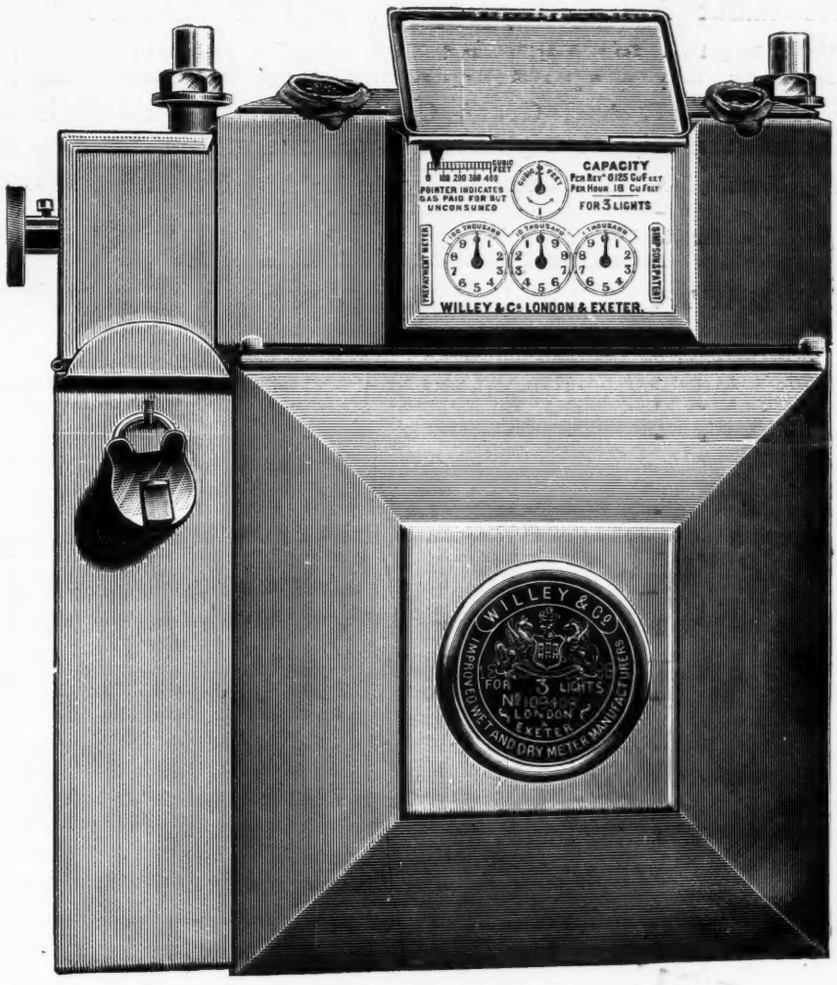

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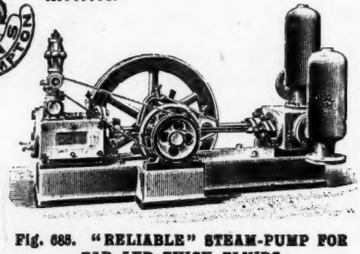

Fig. 688. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

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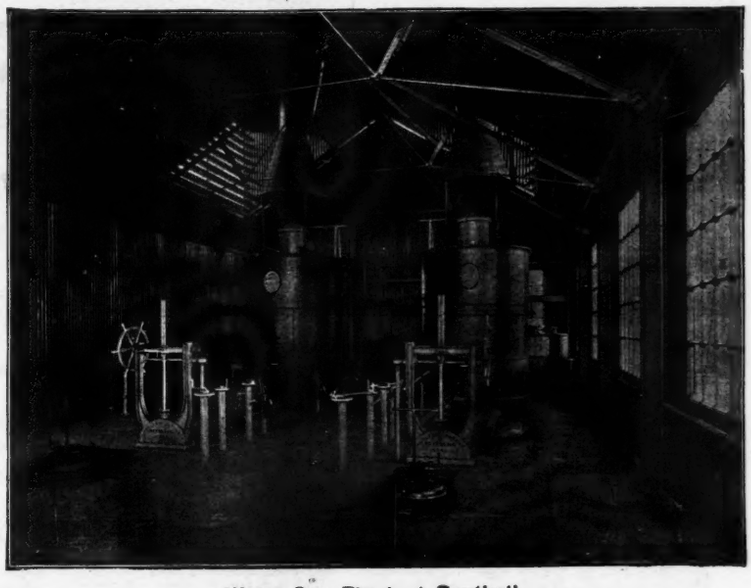

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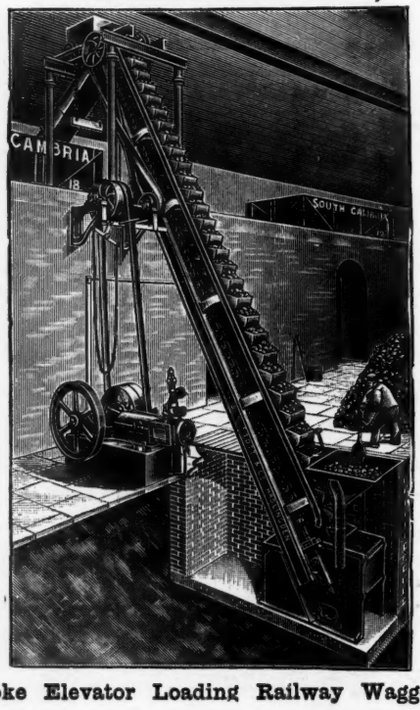

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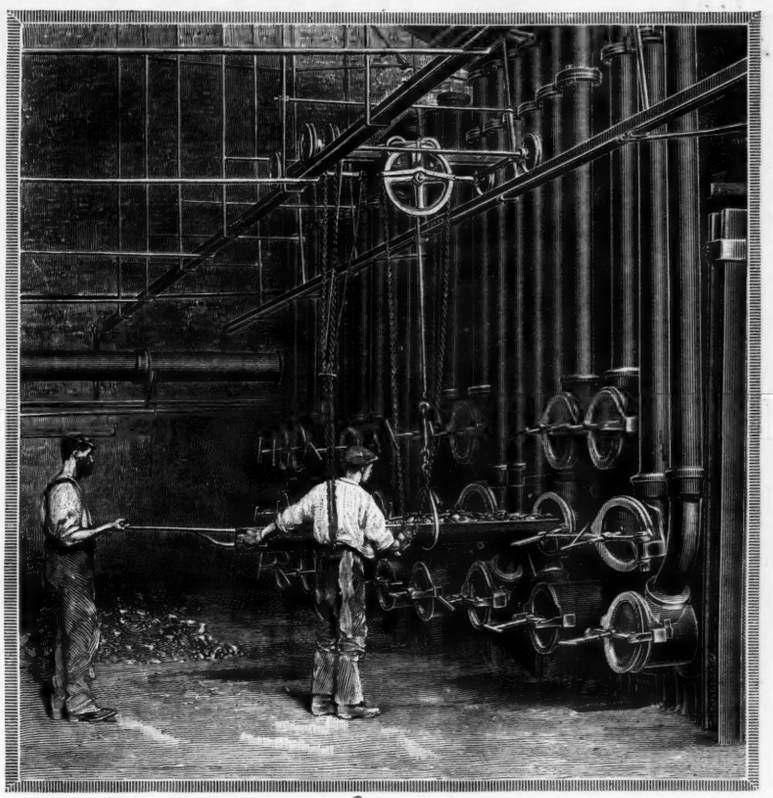

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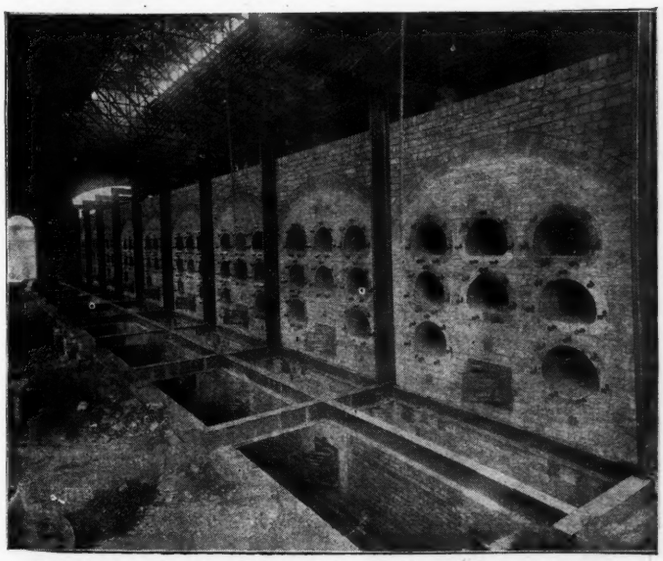

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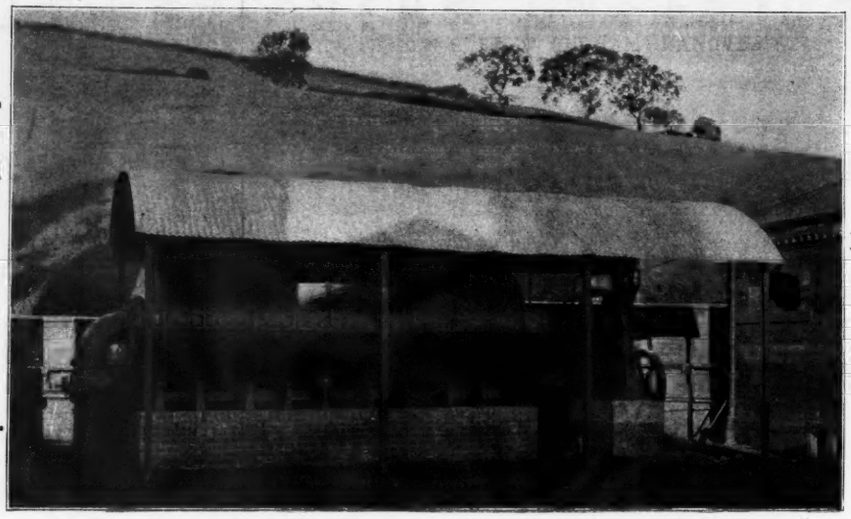

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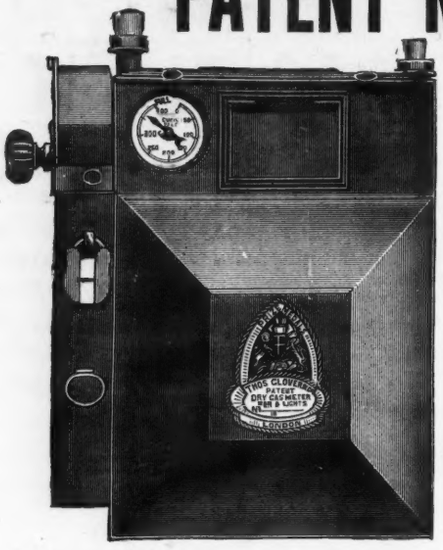

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EDITORIAL NOTES.

Two More Congresses.

LAST week's congresses included that called after the Church of England, and the Co-Partnership Conference of the Labour Association. The former met in London, the latter at Newcastle-upon-Tyne. It is a noteworthy evidence of the extensive development of the gas industry, that it found representation at both gatherings. It is no less striking a tribute to the outside reputation of Mr. George Livesey, that he was the chosen representative of the industry in each case. We give elsewhere the gist of his contributions to these proceedings. It is understood that the Bishop of London wished to have the views of so typical an employer on the subject of Sunday Labour; and Mr. Livesey, one may be sure, was only too glad of the invitation to say something for the cause of reducing unnecessary Sunday work of which he has always been so firm and powerful a friend. The daily newspapers, as by agreement, succeeded in conveying to their readers a very meagre idea as to the contents of Mr. Livesey's paper. For this misrepresentation the author was, perhaps, partly to blame. He seems to have thought it desirable to surround what he could say from his own knowledge concerning the progressive diminution of Sunday Labour in gas manufacture, with some general reflections upon the occupations in which it is on the increase. Naturally, the newspaper reporter, representing the "man in the street," fastened upon the part of the paper dealing with the aspect of the subject of which he was as competent an observer as Mr. Livesey, and made it appear that the author was a mere narrow-minded Puritanical Sabbatarian. The "Daily Telegraph," for example, dismissed the paper with the genially superior comment that, "Until there is a "better understanding upon the point, much Sabbatarian "energy will be devoted to Partingtonian demonstrations "against the Atlantic Ocean." Seeing that the proprietors of the "Daily Telegraph" have so recently lost heavily by attempting to treat the so-called "Sabbatarian energy" of the nation as a spent force, it might have occurred to the Editor that the whole subject deserves the respectful consideration due to a question of practical politics and hard business.

Let us try, very briefly this time, to clear the ground for a "better understanding upon the point," with exclusive reference to the conditions of the gas industry. It is best to tackle great problems like this in detail. The cause of Sunday Observance, like that of Old-Age Relief, must be undertaken in the spirit of the old saying that "if each "would sweep his own doorstep, the village would be "clean." The rule of sparing Sunday carbonizing as far as possible is of modern institution. Its adoption in the best works was due to the modern growth of the spirit of amenity, not to the ancient Sabbatarian superstition. Its operation was greatly facilitated by the advance of gas manufacture from hand-to-mouth methods and rule-of-thumb practices to a sound system of working, with the generous and intelligent expenditure of capital on plant. Nothing contributed to the movement more powerfully than the success of gaseous firing. Over and above all these material facilities, as Mr. Livesey admits, there was the desire on the part of the employers to make the work attractive to a better class of men. On the other hand, it must be confessed that progress along this line has not been universal in the British gas industry. There are backward gas-works, in this respect; and we should have liked Mr. Livesey's paper better if the author had made it support a more pointed personal appeal to the clergy and others who heard him, to satisfy themselves how the particular gas undertakings in which they might be individually interested stand. It is waste of time to talk of such a cause in the abstract, although average data are necessary in their way. Sunday rest for gas stokers is, in nine cases out of ten, only a question of money. The Trades Unions, as Mr. Livesey says, have adopted the handy device of demanding double pay for Sunday work; but their motive in so doing is not above suspicion. In order to be able to dispense, during ordinary times, with Sunday carbonizing, a certain amount of reserve producing or storage power is essential. This means capital outlay. The municipalization of gas undertakings usually has the effect of sparing the outlay of capital on "unnecessary" luxuries. Is the reduction of Sunday labour one of these?

At Newcastle, Mr. Livesey was on his other favourite fighting ground—profit-sharing. Here, we believe for the first time, Mr. Livesey carried the argument forward to the stage that co-partnership is the necessary complement of profit-sharing. Otherwise, the system is liable to fail for the familiar reasons advanced against it—that the "workmen do not respond;" the men "do not take suffi-"cient interest;" and so forth. Whatever else one may think of Mr. Livesey, it is incontestable that he is a dogged hand. There is no "flash-in-the-pan" about his propagandism. In the "JOURNAL" of the 26th ult., discussing the latest South Metropolitan circular to profit-sharers, we remarked that investment of the men's share of profit is not an essential part of the principle. Mr. Livesey now takes up this point, and declares that it ought to be, if profit-sharing is to be permanently beneficial to the men. This view may be the correct one; but it must be conceded to be an after-thought—if not of Mr. Livesey, certainly of most other students of the idea of profit-sharing. For evidence of this, see what Mr. James Mawdsley had to say on the point in a recent issue of the "Oldham Chronicle." Recognizing the possibility that the bulk of the bonuses withdrawn by the South Metropolitan profit-sharers goes for "jollifications," this veteran Trade Unionist inquires, What of it? Why should not the men be free to do as they please with their own—if it is their own? Does Mr. Livesey inquire to what use the ordinary shareholders put their dividends? If not, then there is no better justification for this inquisitorial noticing of what the profit-sharers do with their bonus. This reasoning is quite natural, in such a quarter; but it is vitiated by a fundamental fallacy. Dividends are the end and object of the investment of capital; profit-shares are the means to an end. Shareholders and bonus-taking workmen are not upon the same footing. It is needless to carry the contrast further. The grant of a share of the profits to the employees of a firm is an act of grace on the part of the proprietary. There is no getting over this origin of the thing. The workpeople have no sort of right to it. They do not subscribe for it. What the proprietor gives, he can refrain from giving, at his own discretion. And refrain he will, if he sees that his benevolence is scorned, or turned to an evil use. When this happens, another scheme of profit-sharing is said to have failed. It is Mr. Livesey's case that it is for the workman to apply his bonus to the object of making his interest in the business a permanent one, not within the power of the employer to take away. Unless he does this, there is a reasonable presumption that he does not value the privilege accorded to him; and it is only fair to the others that he should make way for some other and more appreciative man. In a word, lack of discriminating power has been the bane of cash profit-sharing systems. This power the South Metropolitan Directors have invoked by applying the test of investment. It is probably the least invidious means of discrimination. In this connection, Mr. Livesey's references to the Crystal Palace District Gas Company's experience are instructive.

A Season of High Prices.

THE problem of the cause and course of market values is apparently as insoluble as that of the nature of Life itself, or of any other of those "origins" of which Professor Poynting discoursed so luminously at Dover last month. The price of materials of construction and of manufacture, including labour, has gone up enormously during the last year. Everybody in trade feels it, and nobody knows the reason for it. Some people may entertain the belief that by their own astuteness they can effect an alteration of the market prices of certain commodities in which they are interested; but the greater truth probably is that individual men can no more affect market prices, in the long run, than they can change the weather. Merchants can, of course, buy well or badly for themselves. They can elect to carry stocks at the wrong time, and so forth; but the course of market values seems, on the whole, to be uncontrollable and irresistible. This lesson appears by the reports that trade in the United States is actually in the same condition as it is in this country, and in industrial Europe generally. According to information collected by our American contemporary "Progressive Age," there has been an advance of about 125 per cent. in the price of pig iron between June of last year and September of this year. Other notable advances are: Steel 100 per cent., tin 106 per cent., pipes 184 per cent., and oils 100 per cent. Some manufactured articles have correspondingly advanced in price, others have remained at the same or have even receded in value. Observers of these facts of the time cannot satisfactorily account for them. It is no explanation to describe trade as "booming," because what we want to know is why it "booms." One might as well ask why one summer is dry and another is very wet. The study for the man of business is to satisfy himself, as long beforehand as possible, what course the markets are likely to take. It is the same kind of anxiety as that which troubles a townsman on starting out in the morning, as to whether he ought to take an umbrella. Some men are never without this protection; but this is then more a trick of habitude than deliberate providence against a rainy day. Men in business can rarely afford to always carry the particular kind of trade protection they would like in time of need. They may as well give up the idea that the course of the markets will ever be adjusted to meet their wishes. During seasons of inflation, as the present, those who are able to go with the movement will be well advised to help it on to the utmost. That the time to push trade is when it is already good and growing, is one of the soundest maxims of commercial philosophy. The hardest burden falls upon those industries which, like gas supply in some stagnant places, do not advance with the rush of trade, while having to pay advanced prices for all necessaries. The only possible thing to be done in these cases is to keep requirements as low as possible. If it is the excessive demands of growing trades that force up prices, let the expansive concerns pay for it. There is no reason why others should be victimized. Unfortunately, many timid dealers rush to buy when prices begin to rise, for fear they will go higher; and thus they contribute to bring about the result they fear.

Lord Farrer.

THE announcement of the death of Lord Farrer, on Wednesday last, at the age of eighty, cannot be passed over without sympathetic recognition in these columns of the good service rendered to the British public, and the gas industry, by one who was in his day among the most deservedly respected of the honourable body of permanent Government officials upon whom the burden of public affairs immediately presses. It is the permanent officials—the heads of the Services—who really carry on the vast business of governing this country; and as a member of this distinguished company, he who was for so long known as Sir Thomas Farrer, the Secretary of the Board of Trade, had more to do with the shepherding of the mercantile and industrial interests of the nation than outsiders knew or suspected. After his retirement from official life, full of years and honours, Lord Farrer applied his apparently unflagging controversial powers, and the rich resources of his mind, to the elucidation of numerous economical and fiscal problems. As an ardent Cobdenite, he seemed sometimes to be one of the faithful remnant of those who preach a "creed outworn." Yet he had inconsistencies which proved him to be but human; and some of his later briefs were taken on behalf of what might be designated "fads." During his official lifetime, however, which lasted for forty years, Sir Thomas Farrer was the Board of Trade personified; and as such he was the convinced Free Trader and Individualist, ever combatting economic fallacies, and keeping governmental regulation of industrial enterprise at the farthest possible distance from all sorts of withering meddlesomeness.

As Permanent Secretary to the Board of Trade during the formative period of the British statutory gas industry, Sir Thomas Farrer had much to do with the settlement of the scheme of gas legislation which took place in 1875-6. The report of the Select Committee on the Powers of Charge of the London Gas Companies refers to the "full "and interesting memorandum" drawn up by him upon the position of the Gas Companies in 1876. This paper is reprinted as an appendix to the report. It remains invulnerable as an exposition of the history, and a defence of the treatment applied to the London Gas Companies at the time. Lord Farrer was always a believer in the sliding-scale principle accepted by Mr. Forster's Committee in 1875; and he was no friend of municipalization. If Lord Farrer had a fault, as a thinker on economics, it was a certain pedantry which prevented his allowing sufficiently for the power of individual executants to warp the best principles. He had an overweening confidence

almost in what he called "the strong sense and vigorous "individuality of Englishmen." He could not understand fools, nor conceive of anybody outside a lunatic asylum persisting in demonstrably wrong economic courses.

This is what the writer of the obituary notice in "The "Times" meant by hinting of his subject that "perhaps "he gave too often an opening to those who gibed at "political economy as a collection of copy-book maxims "which were not new and which were not true. Perhaps "his 'cocksureness' in regard to some economical prob-"lems was to be envied rather than imitated by younger "men." Lord Farrer, in short, was one of the old school, who held that mankind are guided by reason in the conduct of their commercial and other affairs. This was the chief ruling idea of his masters Ricardo and Mill, as it was shared by his contemporaries Huxley, Tyndall, and Spencer. Younger men, however, who have not attained to the dignity of the arm chair in the cosiest corner of the Club sitting-room, know only too well that this flattering assumption is but half true. Man, being a reasonable being, will not pass by a sixpence in the road if he sees it; but how many who found such a coin would, from prudential considerations, refrain from spending it at the next public-house? Lord Farrer lived long enough to witness the science of political economy pass from the expression of ruling principles, which did not always act, to the study of the things which are actually done by men in their dealings with each other. He never became at home in the new school. For example, while it would be unjust to say that he never quite dissociated himself from the older economists who did not see why labour, like any other commodity, should not be beaten down to the lowest figure the seller would take, he could not find any dialectic justification for those who thought that it was the part of a good employer to set an example of encouraging treatment of workpeople. Yet Lord Farrer was emphatically a man of light and leading for his generation. As our contemporary remarks: "In times to come, in presence of "seductive schemes of intervention and control, we shall "sorely miss the clear courageous words of this unfailing "champion of individual liberty." The world goes on all the same; and the example, rather than the precise teaching, of every worthy man of a past time is an additional force to guide it aright in the future.

The Law's Delays.

It is generally from the harassed and impoverished litigant that one hears denunciations of the delays which so often deprive "justice" of its justice; from the legal profession there is rarely ought beyond "special pleading" defences of the system under which they do uncommonly well. We experience, therefore, both pleasure and surprise in reading the presidential address delivered last week by Mr. Henry Manisty to the Incorporated Law Society, at their annual provincial meeting at Dover. [Yet another conference, and again at Dover; the place will become too learned for mere ordinary mortals!] Mr. Manisty performed an excellent service when, as President of the Lawyer's Congress, he declared that it was discreditable to us as a nation that, owing to the delays in the hearing of causes, the uncertainty in point of time when causes may be heard, and the enormous expense which must be incurred in litigation, men would even forego their just claims—or claims which they and their advisers believed to be just—rather than submit them to the decision of the Courts. The remedies suggested by the speaker were two-fold: An extension of the jurisdiction of the County Courts to disputes involving amounts up to £100 (the present limit is £50); and a reconstitution of the Queen's Bench Division, on the lines of the Court of Chancery. Mr. Manisty suggests that throughout the working year—he does not believe it practicable to seriously curtail the Long Vacation—there should sit at the Royal Courts, a fixed number of Courts of the Queen's Bench Division, each with its own list, for the trial of witness actions. This strikes us as a suggestion of much practical value; and we hope that Mr. Manisty's address will receive attention in high quarters. The change would involve a re-arrangement of the circuit-system (which is, in fact, in great need of overhauling); but that should not prove an insuperable obstacle if only the question be taken up by the authorities in a bold fashion, and with a sincere desire for effective reform. As to the practicability of the present County Courts dealing with the large number of cases in which the amount in dispute is above their present, but below the suggested limit, we have very serious doubts, especially bearing in mind the considerable addition to the work of some County Courts involved in the arbitration duties of the Judges under the Workmen's Compensation Act. Moreover, from the correspondence recently published in the "Standard," under the heading of "County "Court Delay," it would seem that the procedure in numerous Courts involves, in the opinion of many, an unjustifiable loss of time and money upon plaintiffs suing therein; and we think this charge would be endorsed by the bad-debt collectors of many gas companies. It is doubtless true that very many cases which at present go to the High Courts might very well be dealt with by a County Court Judge; but, before such devolution can be effected, the lower Courts must be put in a position to deal expeditiously, not only with the additional work, but also with the cases which at present come within their jurisdiction. Otherwise, confusion will be only worse confounded. Whatever remedy may be adopted, however, it is high time that some effective step were taken to relieve the congestion of the Law Courts. We hope that Mr. Manisty's address and support will encourage laymen to urge the need of reform upon the powers that be.

The Oratory of Technical Meetings.

A suggestive article on "Technical Discussions" has recently appeared in "Engineering." It originated in reflection upon the enormous volume of talk upon scientific and technical subjects that has been reported this year, as every year, in the periodicals which chronicle the proceedings of various Associations. At some of these meetings the object has been the encouragement of discussion; the readers of papers confining themselves, by design, to the mere bringing forward of debatable topics. This was the dominant idea of the Civil Engineers' Conference; and very successfully was it realized, on the whole. Yet our contemporary thinks that, in spite of all the good speeches which are made on these occasions, the average of oratory at technical meetings is but low. This is not for dearth of speakers, but usually for lack of proper preparation. Those of us whose lot it is to attend technical meetings well know the evil complained of. It has diminished since the fashion arose of having prints of the papers circulated in advance—especially when the author arranges to send copies to those whose views of the subject he proposes to challenge or confirm. This is the best way to get up a good discussion. As our contemporary remarks, the antithesis is the case where a man "commences by saying "that he had not seen the paper before he entered the "room, and had not heard the whole of it read; but that "on page 4 was a statement with which he did not agree, "that on page 6 the table seemed imperfect," and so on through a mass of futile twaddle. It is true also that "in "all Technical Societies there are men who are certain to "speak at every opportunity, and yet who never say any-"thing worth listening to." The ambition of these time-wasters never rises to the point of preparing a week beforehand to make a really telling speech. Then, the pompous bores! What a blight, that might be felt, falls upon a meeting when a gentleman who reckons himself eminent rises with his raucous "Mr. President! I-er-remember "trying something of this kind twenty years ago;" and so on. The worst of it is that these platitudinarians freeze the blood of modest men who could contribute something fresh and valuable to the discussion, if they had the chance. "The good speeches which are never uttered exceed in "number those which are heard." Something like this has been remarked before. We agree with the statement that "Technical Societies would enter on a new career if "the members would carefully scan the programmes of "forthcoming meetings, and would procure copies in ad-"vance of papers dealing with subjects which they under-"stand, with the intention of confirming, or controvert-"ing, to the best of their ability, the statements which they "contain." But if this is all that the members should do, where are the papers themselves to come from?

The Transvaal War and the Gas Industry.

On Wednesday last—upon the initiative of the South African Republic—the sword replaced the pen as the instrument for determining the differences between that State and our own country. So far as the gas industry is concerned, the effect of the war, except upon one Company, will necessarily be slight and indirect. The calling

out of a part of the Reserves, together with the active enlisting that has taken place, will tend, to some extent, to reduce the supply and increase the price of labour; while heavy war expenditure will harden money (involving higher rates of interest on bankers' loans) and depress the market value of shares. In reference to the calling out of the Reserves, we would express, in passing, the hope—or rather the conviction—that the Gas Companies of the country will not be behind the many other large employers of labour in granting "leave of absence," and, in the case of married men, some gratuity or allowance, to such of their servants as may be called upon to leave their situations to serve their country. Only thus indirectly will the war affect the great majority of British gas undertakings; but in the case of one Company (the Gaslight and Coke Company), the Boers' ultimatum will make a direct mark upon the balance-sheet. The gold mines of South Africa are very considerable customers of that Company, who make and export large quantities of potassium-cyanide for use in the "cyanide process" of extracting gold. The Company will, therefore, have either to throw their cyanogen plant idle, or accumulate a very considerable stock of cyanide, "to eat its head off" until peace is restored and mining resumed in South Africa. That the war—which can have but one result, and will, we hope, be as short as it must be decisive—will eventually make for the advancement of civilization and justice (and their corollary, security of life and property) in the Transvaal, there can be no doubt in any but the most perverted of minds. The Horseferry Road administration have, therefore, only to bide their time. Meanwhile, however, they will have to pay interest on capital, material, and labour alike.

WATER AND SANITARY AFFAIRS.

THE opening meeting of the London County Council last Tuesday passed off without any declaration of the intentions of the Council in regard to the Metropolitan Water Question. It is true that by this time their policy is pretty well known; and therefore there was scarcely any need for a reiteration of it. Moreover, as the report of the Royal Commission is still under consideration, things are now much as they were before the recess. The time is approaching, however, for giving the usual parliamentary notices; and the proceedings preliminary thereto will doubtless cause the Council to show their hands. Nevertheless the meeting on Tuesday was not altogether devoid of interest for "JOURNAL" readers, inasmuch as the Council had before them the announcement of the resignation of Lord Onslow, the leader of the Moderate Party, to whose fairness in debate full testimony was borne. The party will be unquestionably the poorer by his Lordship's absence. By a sad coincidence, on the following day another conspicuous member of the Council—Lord Farrer—was removed by death; and thus the Progressives were deprived of one who was formerly their Chairman. Here, again, is a party loss which it will not be easy to repair, as Lord Farrer's sterling qualities were specially valuable in steadying those of his followers who were in the habit of displaying a little too much ardour. If we differed from him on certain points of water policy, we never for a moment questioned his sincere desire for a settlement of the Metropolitan Water Question in a way which he conceived would eventually be best for the general body of consumers.

Alluding to the affairs of the East London Water-Works Company (to which some considerable space was devoted in this column last week), our contemporary the "Pall Mall Gazette" thinks the Company are making rather too much profit, and suggests that, in the event of fresh legislation, Parliament should see that the consumer has some of it. Last half year, the profit made was £82,302 on a capital expenditure of £3,197,223; and £72,936 was available for dividend, against £87,220 in the corresponding period of 1898. The Company are allowed to divide up to 10 per cent. on the ordinary stock; and they are declaring 7 per cent. Parliament is not so regardful of the consumers' interests as our contemporary may suppose. The West Middlesex Water Company some years ago voluntarily commenced to allow rebates on the amount of the accounts; but the conditions imposed upon the Company last session will necessitate the withdrawal of this concession. Here the consumers fared better at the hands of the Company than at those of the Legislature. Neither the East London Company nor any of the others can afford to be liberal when so much of their revenue has to be spent in protecting their interests.

One of the questions which from time to time come under public notice in the proceedings of congresses is that of the pollution of rivers and streams; and inasmuch as these sources must continue to be largely relied upon for furnishing the water supply of towns, it is of the highest importance that they should be kept as free as possible from contamination. This subject was dealt with by Mr. A. E. Fletcher in his address to the Chemistry Section of the Institute of Public Health on the occasion of their recent congress at Blackpool. Mr. Fletcher, as our readers may remember, was for some years Chief Inspector under the Alkali, &c., Works Regulation Acts, and in that capacity his energies were directed to the purification of air rather than that of water; and therefore his special qualification to speak on river pollution is not at first sight apparent. But it must be borne in mind that, with the aid of a number of district inspectors, he had to carry out the provisions of an Act which it is generally acknowledged has been largely successful in leading to the adoption of more careful methods of working than manufacturers once thought to be necessary, and, as the result, in keeping out of the atmosphere much of the offensive matter which would otherwise have been allowed to mix with it. If judicious legislation has been the means of preventing the pollution of the air with noxious gases, Mr. Fletcher holds the opinion that much good might be done by following the same course with regard to the preservation of rivers and streams from possible sources of contamination.

It may be urged that legislation having this object in view already exists in the shape of the Rivers Pollution Prevention Act, 1876, under which no noxious matter is allowed to flow into any public watercourses. But Mr. Fletcher points out that there is no inspector to enforce the provisions of the Act, proceedings under which can only be taken by a Sanitary Authority, and with the consent of the Local Government Board. Under these circumstances, the Act has been practically useless; and therefore Special Acts have been granted in the cases of the Mersey and Irwell Joint Committee and the West Riding Rivers Board, both of which, being "Local Authorities" as defined in the Act of 1876, have been able to appoint their own inspectors, and thus remedy the defect complained of. Mr. Fletcher naturally asks why a General Act, applicable to the entire country, has not been passed. He thinks the Alkali Act would serve as a model; and if a staff of inspectors similar to those who administer that Act were appointed, he does not see any reason for doubting that a rapid advance would be made in the direction of river purification. The Alkali Act makes it incumbent upon the owners of works coming within its provisions to use "the best practicable means for preventing the dis-"charge into the atmosphere of all noxious and offensive "gases evolved in the work" carried on therein; and Mr. Fletcher trusts soon to see placed upon the statute-book a Rivers Pollution Prevention Act in which the standard of purity held up shall be that which can only be attained by the use of "the best practicable means" for cleansing all effluents, and the provisions of which should be enforced by a staff of efficient inspectors. The improvement effected in the condition of the Thames through the vigilance of the officers of the Conservancy Board, may be cited as an example of what may be done by systematic inspection.

The words "all effluents," in the preceding paragraph, of course include those coming from the sewers of towns, which in too many cases cause contamination of water. It is a serious question whether we have not been on the wrong tack in dealing with sewage. When it has been shot into the sea, we have been charged with throwing away valuable manurial properties; and when utilized on a farm it has not proved to be a commercial success. Treatment by precipitation is by no means perfect; the effluent containing most of the nitrogenous portion of the sewage—that which has any manurial value—while the solid residue, which has to be disposed of, is nearly worthless. The ideal of the old sanitarians—"the rainfall to the "rivers, the sewage to the soil"—has not yet been fully realized; but systems of sewage treatment which have lately come to the front will assist in the attainment of the object the former investigators had in view, and as a consequence will become valuable auxiliaries in the work of checking the pollution of rivers.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 951.)

THE Stock Exchange remained quite calm and placid last week. Business was naturally not abundant, taking all the departments together; but the tendency was favourable from the very start. The Boer ultimatum quickened the pulse a little for a time; but the markets soon recovered their serenity, and progressed smoothly to the close. Prices for the most part show a fair rise; Consols marking an advance of ¾. Many investors have already taken advantage of the recent fall; and strong speculation for a rise in South African mines shows their confidence in that quarter. The condition of the Money Market has been much easier. There was an abundant supply adequate to meet all possible demands for short loans; and discount rates ruled somewhat easier. Business in the Gas Market was rather remarkable; being almost entirely restricted to Gaslight issues. It is scarcely an exaggeration to say that, if the transactions in that one undertaking be eliminated, the aggregate of business done in all the rest would hardly suffice to make up a moderate day's work. Prices also remained in a corresponding state of stagnation. With the exception of those automatic changes produced by the quotation on Thursday of a few issues *ex div.*, only one single stock—and that one of minor importance—underwent any variation. So it was a Gaslight week, and nothing else. The ordinary was pretty freely dealt in every day, and at steady figures which never ranged outside 103½–104½, with indications of firmness at the close. A rather moderate amount was transacted in the secured issues at good even figures. In South Metropolitan, there were only four transactions; and in Commercial none at all. The whole array of Suburban and Provincial undertakings furnished only three deals; but at the Mart some Tottenham and Edmonton stock of both classes realized good prices. The Continental Companies were not quite so absolutely torpid as those already referred to; but still they were extremely quiet. The remoter undertakings furnished the only variation; San Paulo showing a serious fall. The Water Companies were about as quiescent as usual, with a rather weaker tendency. Changes in value were few and slight; but they were all in the downward direction.

The daily operations require no detailed notice. Suffice it to say that on Wednesday San Paulo receded ½. On Thursday, Kent Water had a fall of 2. On Friday, San Paulo was 1 lower. On Saturday, the selling price of New River was lowered from 440 to 435.

ELECTRIC LIGHTING MEMORANDA.

The New Model Provisional Order—The Question of Assignment—Opinion of the Board of Trade—Breakdown at Hastings.

THE Board of Trade have issued a new Model Provisional Order, as a consequence of the passing of the Electric Lighting Clauses Act of last session. It is a marked advance as regards conciseness upon the older classes of Provisional Orders. Experience having shown what are the general statutory powers required by undertakers of electric lighting, these were once for all enacted by the Act referred to; so that the Provisional Orders of the future will consist of a couple of pages stating the locality of the particular venture, delimiting the area of compulsory supply, and fixing the maximum price of current. It is almost as simple and succinct as a dog or gun licence. To this pattern, doubtless, we shall have to conform in the course of time for all statutory permits to engage in any enterprise subjected to parliamentary regulation. Parliament will pass an enabling Act, in the practical sense of the term. Any local authority, company, or person desirous of taking advantage of the general statute will merely have to furnish the Executive Department with the proper credentials, and all the legal forms will be condensed into a piece of paper forwarded to the applicant by post. And why not? There is no real reason why an application by a local authority for an Electric Lighting Order should be so expensive as the operation has been hitherto. Five hundred pounds, and even more, is a good deal for a small Urban District Council to pay for mere permission to embark upon a statutory enterprise. Many of them have been driven into this piece of extravagance as a preferable alternative to letting into the district a speculative company. It has tended to remove the reluctance of frugal district councillors to this costly step, that there has always been the possible eventuality of disposing of the Order to a company working under the auspices of the local authority.

In this way, scores of Electric Lighting Orders have been procured by local authorities who had scarcely the remotest idea of carrying them out at the charge of the ratepayers. One cannot blame the adventurous electric light companies who drove the local bodies to this course of action. It was all a matter of business for them. The crack of their statutory notices was as that of a whip to keep the somewhat lagging electric lighting enterprise going; and they must have found the effort a paying one in the long run, for they have kept it up year after year. With much groaning and many misgivings, some of these Provisional Orders for small municipal schemes have been carried out. It is satisfactory to know, however, that the old illusion of the invariable profitableness of all municipal electric lighting, whatever the scale or the character of the place, has been completely dispelled by the accumulated experience of the business, so sensibly marshalled by the technical advisers of the Corporations of Penzance and Ramsgate. These are not mean nor insignificant towns; but the local authorities are forewarned that if they think to indulge in the luxury of public electric lighting, the rates will have to help pay for it. Some few municipal Orders have been transferred to private hands; but not many, for the obvious reason that where the business offers a reasonable expectation of profit, the holders of the Order desire to have this for themselves. There are still a number of instances where it is doubtful if the public authority could carry out an Order so well as a company—say, the gas company; and here the power to pass on the Order is advantageous to the original holders.

The Board of Trade now announce that the fact of the Electric Lighting Clauses Act not containing any provision enabling local authorities, as electric lighting undertakers, to transfer to others their powers, duties, and liabilities will be taken by the Department as a discouragement of the older practice in this regard. It is accordingly stated that no such provision will be inserted in any future Order "save in circumstances of a very special character." This warning may not have the effect of checking the demand for municipal Orders; but if acted upon, it will deprive them of any realizable value. It puts statutory electric lighting upon the same legal footing as statutory gas and water supply, in that devolution of the powers and privileges of the Special Acts to a lessee or contractor is not permitted. Still, there is the express sanction of sub-letting or assignment in Clause 11 of the Electric Lighting Act, 1882, which has not been taken away by the Act of the present year. Inasmuch, however, as the sanction for sub-letting was left to the discretion of the Board of Trade, and the Board of Trade now declare that they feel debarred from giving this permission as a matter of course, the Department remains master of the situation. Let it be plainly understood, therefore, that henceforward any local authority applying for an Electric Lighting Order must relinquish the prospect of recovering the cost of the Order by subsequently transferring it to contractors more willing than themselves to carry it out. This seems to be the chief point of the Departmental notification. It remains to be seen whether the new procedure noticeably economizes money as well as pains.

A perfectly lovely break-down story comes from the Borough Electric Lighting Establishment at Hastings. We cannot attempt a detailed narrative of the affair, which is reported in the fullest and fairest manner by Mr. L. Andrews, the Borough Electrical Engineer, in the current numbers of the leading electrical journals. The incident is regarded as sufficiently important to form the subject of the principal editorial article in the "Electrician." The lights went out, simultaneously with the switching on of the show lamps on the sea front, on the evening of Thursday, the 5th inst. The trouble was located and removed; but the following night the same thing happened again, only worse. The works were plunged in darkness; and it was only the smartness of a driver that prevented a repetition of the Manchester fly-wheel catastrophe. On the Saturday night there was more trouble; but this time Mr. Andrews got over it more easily. The remarkable feature of the occurrence is distinguished by the Engineer himself, who writes that the whole of the alternators running ceased to generate, apparently through the failure of the exciting circuit. Why this sudden demagnetization of the alternators? Nobody knows. The irony of the situation is, as described by our contemporary, that the latest victim selected by Fate to suffer from a mysterious breakdown is "an Engineer who was but a few months ago awarded a premium by the Institution of Electrical Engineers for his paper on 'The Prevention of Interruptions to Electricity Supply.'" This is distinctly humorous on the part of Fate, and deserves recognition in a world wherein the malignity of matter seldom exhibits an aspect calculated to raise a smile. It is possible to sympathize with the Engineer as an individual, while taking careful note of the accident as a further proof of the unreliability of electric lighting systems.

THE BLUE-BOOK OF THE METROPOLIS GAS (POWERS OF CHARGE) COMMITTEE.

FIRST NOTICE.

THERE has just been issued by the Queen's Printers the blue-book containing the report from the Select Committee on the Metropolitan Gas Companies (Powers of Charge), together with the proceedings of the Committee, the minutes of evidence, and appendices. The text of the report has already been given in the "JOURNAL;" and we specially reported the evidence taken at the public meetings of the Committee. It is obvious, however, that the official report, now procurable in its entirety, demands the particular study of those who wish to make themselves fully acquainted with these proceedings. It is unnecessary to say anything more, for the present, about the recommendations to which the members of the Committee set their hands. The time for any reconsideration of these remarkable

findings will be when the London County Council, or one of the Companies implicated, or Parliament itself, proceeds to action upon, or in despite of them.

It will, however, be remembered by our readers that, on the occasion of the last general meeting of the Gaslight and Coke Company, the Governor (Colonel W. T. Makins), who had given evidence before the Committee, thought fit to challenge its composition, and also to accuse it of taking little interest in its work. He seemed to regard it as a fault that the Metropolitan members on the Committee were the most assiduous in their attendance. He said ("JOURNAL" for Aug. 8, p. 376): "The Committee sat thirteen times; but the average attendance of the members was small, and it was not always possible even to maintain a quorum of five members." For an old Member of Parliament, as Colonel Makins is, to go behind the findings of a Committee of either House, with the object of casting discredit upon them by bringing into question the qualifications and attendances of the members, is a proceeding of doubtful advantage. It is about as useful as would be a complaint of Counsel who happened to have lost his case, that the learned Judge was seen to be slumbering peacefully through the greater portion of his eloquent address. Still, since Colonel Makins thought fit to raise this point, it is expedient that it should be disposed of, so far as this can be done by reference to the report. The Committee was nominated on March 16 last, and was composed of fifteen members. Colonel Makins describes it as moved for by Mr. Cohen, a Metropolitan Member, and being constituted of "seven Metropolitan Members and eight Provincial Members." The names are as follow, taking them in the order of their constituencies with reference to this distinction: Mr. Banbury (Peckham); Mr. Cohen (Islington, E.); Mr. Lough (Islington, W.); Mr. Lowles (Haggerston); Mr. Pickersgill (Bethnal Green, S.W.); Sir Andrew Scoble (Hackney, C.); and Mr. Steadman (Stepney). Of these members for Metropolitan Boroughs, all excepting the first and the last represent areas supplied with gas by the Gaslight and Coke Company. Mr. Banbury represents a South Metropolitan district, and Mr. Steadman a Commercial area. The Provincial Members represented such diverse constituencies as the Uxbridge Division of Middlesex, Rhondda, Bewdley, Widnes, Swansea, Argyllshire, Aberdeen, and Leominster, which provided the Chairman. What fault can be rightly found with the selection of this truly heterogeneous collection, is not immediately apparent. Colonel Makins grumbled because neither Mr. John Aird nor Sir John Colomb was among them. This complaint ignores the well-known rule which excludes interested parties from sitting on Parliamentary Committees. The instance cited by Colonel Makins, of the presence of Sir Charles Scotter on the Commission on Automatic Couplings for Railway Trucks, as proving the desirability of having experts on such bodies, is beside the mark. This Commission is not a Committee of Parliament. Sir Charles Scotter is not a Member of Parliament, although this fact would hardly have been suspected from the mention of his name in the same breath with Mr. Aird and Sir J. Colomb. Hence it is scarcely correct to call the two cases "analogous," as Colonel Makins did. Did he, himself, ever sit upon a Gas Bill Committee during his period of service in Parliament?

Next, as to the number of sittings of the Committee. Colonel Makins states the number at thirteen; the report gives fifteen sittings before the submission of the draft report, and two subsequently. It is asserted that the average attendance of the members was small, and that a quorum was not always obtained. At the first meeting eleven of the fifteen members were present; and a thoroughly independent member (in the geographical sense) was called to the chair. At the next sitting, when the inquiry was opened with the examination of Sir Courtenay Boyle, thirteen members assisted. The same number turned up the following week, when Mr. Haward, for the London County Council, completed the sketch of the financial affairs of the Companies, which the Committee were charged to elucidate. There was a falling-off a week later, when Mr. Charles Hunt and Mr. J. Trenner were examined; but still nine members put in an appearance. Eleven members assembled to hear Mr. H. E. Jones; but a fortnight later—the Oaks Day—the minutes record the single instance of failure to form a quorum "at the expiration of one hour." The lapse, which was due, strangely enough, to the defection of the Metropolitan contingent, was repaired a week later, when ten members met to hear Mr. Livesey. Thereafter, for two or three weeks, the attendance fell off, notwithstanding the circumstance of Mr. J. W. Field being in the witness chair. Interest revived with the appearance of Colonel Makins himself, who had audiences of eleven members on each day. It is hardly necessary to further labour the point. The Chairman (Sir James Rankin) was never absent from his post; and there is no real ground whatever for the insinuation that the other members were neglectful of their duty or incompetent to discharge it. The less said about this part of the question the better.

The draft report was brought up by the Chairman, and read a first time on July 21. It is curious to note that the original recommendations were only amended in respect of two particulars. The draft put it that the southern area of the Gaslight and Coke Company, acquired from the London Company in 1883, should be transferred to the South Metropolitan Company "upon fair and reasonable terms." Mr. Pickersgill carried an amendment in the words "fair and reasonable price being paid by the latter to the former Company for their property in the southern area." Another amendment was due to Mr. Lough—"that the prices charged by all the Companies for these slot meters and fittings requires regulation, having regard to the fact that the business is a new one, and has extended with extraordinary rapidity throughout the Metropolis." The last recommendation originally carried the suggestion that the redemption of Companies' obsolete or unproductive capital was to enable the price of gas to be reduced; but the suggestion was struck out.

COMMERCIAL AND TECHNICAL EDUCATION.

WE have on previous occasions pointed out that the subject of efficient commercial education is one of considerable importance to gas and water companies, inasmuch as the prosperity of such undertakings depends, in no small measure, upon the possession of good commercial and business qualities by what we have termed the unprofessional staff. We gave evidence, when the subject was last mentioned in the "JOURNAL," of the growing attention that was being paid thereto, and especially referred to the possibilities for good work in that direction that lay before the newly-projected University for Birmingham. The voice of the reformer has been loud in the land, and has fortunately been heard and heeded by the right ears; the arguments of the theorists having been driven home by a growing consciousness of the necessity for finding some means of better training our commercial classes for the increasingly arduous task of coping with the enterprise and knowledge of our foreign rivals in trade—notably America and Germany. It is always difficult to find practical men willing to listen—much less to pay much heed—to abstract theory; but add concrete proof of the need of reform in the shape of trade endangered or prosperity threatened, and the boot is rather on the other leg, and any windbag with a (self) guaranteed panacea is certain of a hearing.

Signs are not wanting that the necessity for improved commercial education is becoming recognized by the business, as well as by the educational, world, and nowhere more so than in the essentially commercial City of Birmingham. We publish in another column a brief summary of a report recently adopted by the Chamber of Commerce in that city; being the result of a special inquiry by their Education Committee into the subject of the commercial training that is, and that which ought to be, provided by the public institutions of Birmingham. The full report contains much interesting information as to the methods of education both at home and abroad, in addition to the actual recommendations of the Committee for the amendment of methods and increase of facilities. With these recommendations, which we cannot afford space to discuss at length, little fault can be found; and we would only add to our expression of satisfaction that the subject is receiving the attention it deserves in the quarters where its wise solution will have the most immediate and lasting effects, a hope that the insufficient attention hitherto paid to the need for the special training of the commercial classes will not be succeeded by an over-emphasis of the purely utilitarian side of education.

The Committee have sought to disarm criticism on this point by expressing the opinion "that the changes they advocate might be introduced into the curriculum of our schools without detriment to their efficiency as to the means of mental training and general culture." This is a question upon which the opinion of a Chamber of Commerce will not be universally accepted as final. But it is well, at any rate, to know that the danger of neglecting "general culture" is recognized; for, as we have said before, no view of education is anything but partial and inadequate that leaves out of account the value in everyday business life of a mind trained to think and observe for itself, and possessing—in diversified interests and pursuits—the means of ready relaxation and recuperation after close application to the routine of business. Education, whatever the destiny of the pupil, must, to be really valuable, aim, not only at producing in him the special qualifications needed for the work he is intended to undertake, but also at inducing in him what Lord Reay spoke of the other day as "spontaneous activity of mind." We do not want to have schools where the rising generation shall be taught nothing but what is directly calculated to enable them to "get on" in the world—such as the "Muskegon Commercial Academy," described in one of Robert Louis Stevenson's novels, where the pupils had class hours during which they "studied German, French, book-keeping, and the like goodly matters; but the bulk of the day, and the gist of the education, centred in an imitation stock exchange, where they were taught to gamble in produce and securities." A caricature perhaps, but one with a moral.

One passage in the Committee's report to which we would draw attention is that in which they "urge upon employers the necessity of requiring a definite standard of commercial knowledge in all applicants for situations." This is an appeal which we gladly endorse; but there is one great difficulty in the way of employers who wish to follow the advice of the Committee—in regard more particularly to candidates of the working class order—namely, the fact that our Board Schools do not, as is done abroad, grant certificates of general merit to their best pupils when leaving school. Lord Reay, in his recent annual

statement to the London School Board, drew attention to this fact. He said:

> The time has come for the Education Department to take into serious consideration whether it will adopt the system of "merit" and "leaving" certificates which has been found to work so well in France and in Scotland. . . . The great value of these certificates is to create a powerful incentive to regular attendance, to enable employers of labour to show their appreciation of the value of education, to stimulate the zeal of the scholars, and to ensure individual exertion. No reform is more urgently needed at the present time.

Failing the institution of such a system, however, employers may do much to "show their appreciation of the value of education" and of individual efforts for self-improvement; and in this connection we would once more urge upon the directors and managers of gas companies the wisdom of recognizing, in a generous spirit, success in the various technical examinations held in connection with the industry. We are fully aware of the fact that success in such examinations may be evidence of little beyond a theoretical knowledge of gas manufacture and distribution; but this knowledge provides an excellent basis upon which to build up practical experience, while a good pass in the examinations gives real earnest of the industry and worthy ambition of the students. We had occasion, in referring to the results of the last City and Guilds Examination, to congratulate the Gaslight and Coke Company upon the successes achieved therein by several of the younger members of their staff. We shall welcome the opportunity of congratulating them upon setting an example to the gas undertakings of the country by making full use of the good material thus proved to be at their disposal, and thereby affording encouragement to others to increase their economic value to their employers.

The need and the value of sound theoretical knowledge as a foundation for practical training was very clearly put, and strongly emphasized, the other day by Sir Andrew Noble, in his address inaugurating the 1899-1900 session of the Central Technical College connected with the City and Guilds of London Institute. Sir Andrew condemned, as an abuse of technical education, the folly of divorcing practice from theory, and of elevating practical application above scientific knowledge. He declared that any practical technical instruction, and any knowledge acquired in the workshop, should be based on sound theoretic knowledge. He was driven, he said, to enforce this question, because he found that in this country far too much weight was given to practical skill, and what was called "rule-of-thumb," and far too little to theoretic knowledge. "He believed that no genuine success in the higher walks of industry was probable without such thorough knowledge. In his experience, he did not think he had ever known a man rise to the top of the tree without it." Sir Andrew, as he remarked, has had exceptional opportunities for observing what educational antecedents are most likely to produce the best results in the engineering field, as the Elswick Company employ in their various works something like 30,000 hands. His address has, therefore, special value. On many points connected with the question of technical education he confirms, with the weight of his experience, what we have previously argued in regard to all education specially directed to practical ends. In particular, he points out that one of the greatest mistakes that can be made is for a boy to begin special education too early in life, to substitute it for general education, and to attempt to put his knowledge to practical application before he has fairly learnt how to learn. When asked what education he should recommend for a lad destined to enter Elswick, he always says: "Send your son to as good a school as you can; keep him there as long as you can; do not curtail his time of schooling; and do not stunt his intellectual growth by narrowing it down to any special study as taught at elementary schools." "Science," his address proceeds, "mechanical drawing, and such like, are no doubt very useful (as all knowledge is useful) in their way. These studies may prove an irresistible attraction to minds with a strong bent towards scientific subjects; but I fancy most employers would rather that a lad came to them blankly ignorant of both, so long as he had had a good education, and had been taught—and had ability—to think and to concentrate his attention on any subject brought to his notice. In nine cases out of ten, any knowledge acquired by a boy before he is 16 can have but slight intrinsic value. Up to that age, it is not *what* he has learned that we have to look at, but *how* he has learned. It is the habit of discipline, of mental application, of power in attacking a subject, that are so valuable; not, generally, any definite piece of knowledge he may have gained. According to my experience, the most valuable knowledge that a man has at his disposal is that which he has taught himself."

In conclusion, Sir Andrew urged the students to bring enthusiasm to their studies, as without it the best instruction and the best apparatus would do nothing for them. He advised them not to be too utilitarian; not to narrow the search for knowledge down to a search for utilitarian knowledge—for knowledge that they thought would pay. Let them, above all things, pursue knowledge; for it was this pursuit which would stand by them to the end, as at once the greatest and most enduring of pleasures. That is, put into better words than our own, precisely what we had already written, and have always urged.

Our final quotation from this most interesting address shall be a passage which we only wish could be put into the hands of every Trade Unionist in the kingdom—

> The workmanship of many articles made in England cannot be surpassed; but if you require any original or special piece of apparatus, you are frequently compelled—as I have been—to go to Germany or France for their manufacture. I do not desire to press my point too far; and I admit that a portion of this transference of work, which I so much regret, may be due to cheaper labour. But the English mechanic is second to none; and if that false Trade Unionism which endeavours to prevent the most intelligent and skilled from reaping the full benefit of their abilities, be abandoned, I do not despair of seeing this country regain much it has now lost.

But how many Trade Unionists read any paper that does not flatter them to their hurt?

THE EXPANSION OF GERMANY.

The competition of German industries with those of our own country has been of recent years one of the most fruitful topics of discussion, and, to some people, is an ever-present source of alarm. This fact, and the circumstance that many English members of the gas profession have been recently making acquaintance with their brethren in Germany, are grounds for thinking that our readers may be interested to glance at some of the facts as to the growth of the industrial population of that country, as revealed by the latest professional and social census of the Empire. This numbering of the people took place in June, 1895; and the most important figures contained in the volume of statistics published by the German Government last June, are summarized in "The Times" of the 28th ult.

A striking, though not an altogether unexpected, feature of those statistics is the actual, as well as relative, decrease in the agricultural population, side by side with a large increase in the number and proportion of people engaged in industry and commerce. While, compared with 1882 figures, the latter increased by over 27 per cent., the army and professional classes by the same percentage, and the leisured and unoccupied class by practically one-half, the agricultural population has decreased by nearly 4 per cent. It is evident, therefore, that the same process of transfer of labour from the country to the towns that has been going on steadily for many years in England, and is giving rise to many social and industrial problems of magnitude, has begun in Germany; and the recent opposition—successful, for the present at any rate—of the agricultural interests to the construction of the Rhine-Elbe Canal, seems to indicate that a struggle for political supremacy between the agricultural and industrial classes, such as was waged in our own country some half-century back—may be looked for in the near future in the Fatherland. Will this eventually end (as the contest in this country ended) in the adoption of Free Trade? The large increase in the population that is engaged in mining, iron-smelting, and other like industries, and in commerce generally, from 20½ to 26¼ millions in the thirteen years, is, as we have said, not by any means surprising. The German trader has been very much in evidence of recent years; and the growth of the industrial centres of the country has long been patent to the casual observation of the occasional visitor. The classified figures show that the greatest proportionate increase is in the number of persons employed in the chemical industry; the figures being 102,923 in 1895, as against 57,530 in 1882. The intervening period was one during which the aniline dye and kindred trades have marked a considerable development. The great bulk of the increase is, however, to be found in the mining, iron and other metal working, building industries, and under the general heading of "trade."

A classification to which it is said special importance is attached in Germany, is that of the working population into (1) independent persons—*i.e.*, professional classes, manufacturers, shopkeepers, and workmen working on their own account; (2) salaried employees; and (3) workmen. Of the total number of persons employed in the three pursuits of agriculture, industry, and trade, 28·94 per cent. were, at the taking of the 1895 census, independent, 3·29 per cent. salaried employees, and 67·77 per cent. workmen. These figures, compared with those for 1882, show a decrease of the first class in both trade and industry, owing to the spread of the factory system and to supersession of small businesses and home-work by large stores and shops.

In view of the discussion as to the age at which man gets past his work and stands in need of a pension, it is interesting to note that, in Germany, of all persons between sixty and seventy years of age nearly 50 per cent., and of those over seventy years just under 30 per cent., are actively employed. Seeing that these figures are percentages of the total population, male and female, of the specified ages, and that the two sexes are almost equally balanced in Germany, it is obvious that, not only do the German workmen not find themselves "too old at forty," but that the vast majority of them continue to earn their living until they are approaching the "three score years and ten."

The total population of Germany in June, 1895, amounted to close upon 52 million souls; and it is increasing at the rate of rather over a million a year. This is an all-sufficient proof, if any proof, in addition to one's daily observation and hearing, were needed, that she is rapidly becoming one of the most important factors in both the political and the industrial world. That fact is obtaining wide acceptance in this country. Our manufacturers are becoming alive to the necessity for increased activity and efficiency; and we have little doubt that we shall manage to fairly well hold our own. There is room in the world for a Great Germany as well as a Great Britain.

WATER ACTS FOR 1899.

(*Continued from p.* 875.)

THE Barton-on-Sea Water Act incorporates a Company for supplying water within a district extending from Milton and Barton to Lymington. The share capital is £40,000, with power to borrow £10,000. The water-works comprise a well and pumping-station to be situated in the parish of Milton, and completed within five years. An agreement has been made between the Company and the West Hampshire Water Company, for a supply in bulk by the latter on payment of 7½ per cent. interest on the cost of the main and works. The rate for domestic supplies is 7½ per cent. All supplies may be by meter. The price of water supplied to public authorities for sanitary purposes is not to exceed 1s. 6d. per 1000 gallons. Fittings may be removed from buildings left unoccupied for 48 hours.

The Church Stretton Water Act incorporates a Company with a share capital of £20,000 for the supply of the parish of this name, in Shropshire. The source of supply is an impounding reservoir across a tributary of the Carding Mill stream, which is an effluent of the River Severn. Compensation water is to be discharged down this stream at the rate of 62,500 gallons per day. The works are to be completed within five years. The rate for domestic supplies is 7 per cent. The maximum price for water by meter is 1s. 6d. per 1000 gallons. The undertakings of the Church Stretton Water-Works Company, Limited, and the Little Stretton Water-Works Company are to be purchased; and power is reserved to the Local Authority to acquire the whole undertaking at any time within ten years.

The Crowborough District Water Act enlarges the Company's district of supply to include the parish of Mayfield and parts of certain other parishes outside "a radius of three miles drawn from the centre of the western door of the church of the Holy Trinity in Tunbridge Wells." The supply is to be made effective within five years. Additional water-works are authorized, including a well and pumping-station in the parish of Rotherfield, near Maynard's Gate, a reservoir at Cottage Hill, and certain pipe-lines. Pipes in main roads must be buried 2 ft. 6 in. down. The new works are to be completed within seven years. Additional capital to the amount of £20,000 is sanctioned, with one-fourth loan. Free public drinking fountains may be put up and supplied with water by the Company, at their discretion.

The Great Yarmouth Water-Works Act extends the Company's limits of supply to Southtown and other adjoining parishes, with maximum rates one-half higher than those charged in the home district. New pipe-lines are authorized. Additional lands and a portion of Ormesby Broad are to be acquired. The new works are to be completed within fifteen years. The Company are empowered to enforce the provisions of the Rivers Pollution and Public Health Acts, for the prevention of the pollution of their waters. Additional capital to the amount of £160,000 is sanctioned, with one-fourth loan.

The Herne Bay Water Act empowers the Company to acquire 10 acres of additional land by agreement, and to raise £20,000 additional capital, carrying the usual borrowing powers. Clauses are inserted dealing with consumers' and Company's notices.

The St. Neots Water Act increases the capital powers of the Company by £4000, with power to borrow £1000. The Company may sell water in bulk beyond their own limits, but must not apply any of their capital in laying mains or constructing works outside the limits.

The South Hants Water Act authorizes the Company to extend their supply into the parish of Brockenhurst. New water-works are authorized, comprising an adit in the parish of Timsbury and a covered service reservoir in the parish of Lyndhurst. The Company are not to sink wells within two miles of those of the Southampton Corporation Water-Works. The County Council may direct mains to be laid in such position as they think fit, and are exempted from liability for injury to pipes by steam-rollers or otherwise. Lands are to be compulsorily acquired within five years, and the new works executed within seven years. The West Hampshire Water Act of 1893 is amended, so far as it gives the Company powers to supply Brockenhurst, unless the supply is made effective within a year. Certain provisions are made for dealing with Crown lands in the New Forest. New capital to the amount of £125,000 is authorized, to bear a 5 per cent. dividend, with the usual borrowing powers.

The West Middlesex Water-Works Act authorizes the construction of a trunk-main from Hampton to Barnes. The main is to be laid to the satisfaction of the Surrey County Council; but the Council are not to insist on a greater depth than 2 feet from the top of the socket of the pipe to the surface of the roadway. Clauses are inserted for the protection of the Middlesex County Council and the District Councils on the route. The Company's powers of taking water from the River Thames are increased by a maximum of 15 million gallons, to be drawn when the flow of water at Molesey Weir is upwards of 190 million gallons per day. A penalty of £100 per day is enacted for taking water in excess of the statutory allowance. Additional debenture stock to the amount of £250,000, redeemable at par within 25 years, is to be issued under the regulations now applied to London Gas Companies' capital.

The West Gloucester Water Act extends the limits of supply of the Company to a number of parishes and places, subject to the obligation to make the supply effective within five years. Clauses are inserted for the protection of the Bristol Water and Gas Companies. The Company may raise £60,000 additional capital, with the usual borrowing powers. Supplies of water by meter are not to be compellable for less than 30s. a year.

The Woking Water and Gas Act authorizes the construction of a pumping-station, with an intake from the River Thames, at Chertsey. From this station, a main is to run to a junction with the Company's existing main in the parish of Horsell. Another well and pumping-station are to be made in the parish of Stoke-next-Guildford, and connected with the existing main in the Stoughton or Woodbridge Road. The Company may take 1 million gallons of water daily from the River Thames, with a possible excess of 6 million gallons under certain conditions. By this and the West Middlesex Act, it is proposed to make Molesey Weir suitable for measuring the water flowing over it, at the expense of the Companies authorized to draw water from the river. The two statutes have several provisions in common. The Woking Company are forbidden to supply any Thames water outside the county of Surrey. The Company are not to intercept any water flowing into the Thames by any defined channel. Clauses are inserted for the protection of the West Surrey Water Company and certain landowners. The necessary lands must be compulsorily acquired within five years, and the authorized works completed within fifteen years. The limits of supply are extended to the parishes of Worplesdon, Bisley, Pyrford, Wisley, and Ockham, to be made effective within seven years. Certain restrictions are imposed on the Company's pumping powers at the second authorized well, in the interest of the Corporation of Guildford. The Company's capital powers are increased by £120,000, with the usual proportion of loan. The Company are authorized to deal in meters and fittings.

The following Acts relating wholly or in part to water supply appertain to Local Authorities:—

The Clay Cross Water Act authorizes the Urban District Council to acquire and carry on the undertaking of a Company originally incorporated in 1856. As part of the consideration, there is to be included a sum of £105 in respect of the taxed costs of winding up. The maximum price of water supplied by meter is 9d. per 1000 gallons. The Council are authorized to borrow from bankers on current account. The capital loan is to be redeemed in 50 years. The Council are also empowered to take a supply of water from the Chesterfield Rural District Council.

The Derwent Valley Water Act is a voluminous statute which does not lend itself to intelligible abstracting.* It runs to 182 pages of print, and may be best summarized as providing for the future division of the available flow of the Rivers Derwent and Ashop, and constituting for this purpose a Joint Board representative of the Corporations of Derby, Leicester, Nottingham, and Sheffield, and the County Council of Derbyshire. The Act is the outcome of three Bills presented to the last session of Parliament, all opposed in turn. Agreement succeeded to this opposition; and the formation of the Joint Board was decided upon. The Board itself requires a capital of £5,500,000. The Derby Corporation require £120,000, the Leicester Corporation £600,000, and the Sheffield Corporation £425,000. The name of the Board is to be the Derwent Valley Water Board. It will consist of fifteen members, taken from the constituent authorities. Members must not be interested in contracts or work done for the Board, nor must they derive any profit from the funds of the Board. This provision does not extend to a mere shareholders' interest; but such shareholders must not vote in respect of the business of their Company with the Board. Each of the five constituent authorities may appoint an auditor of the Joint Board's accounts. A paid standing arbitrator is to be appointed at the first meeting of the Board, to decide doubtful questions under the Act. The Board are to acquire their lands within seven years. The impounding reservoirs and other works for appropriating and distributing the waters belonging to the Board under the Act, numbering 56, are to be completed within fifteen years. Rainfall determinations are to be made within the watershed for six years; and the compensation water is to be for every day $\frac{1}{365}$ part of one-third of the amount of the available rainfall, discharged in a regular, uniform, and continuous flow for ever. The distributed water is to be treated for the prevention of plumbism. A part of the Act deals with interests requiring protection in great detail, even to the point of forbidding the use of barbed wire for fencing. The shares of water belonging to the different constituent authorities are defined. District Water Supply Committees may be formed. A part of the Act relates to the obligations of the Board to existing Water Authorities. The capital of the Board is to be redeemed in 60 years, beginning in 1909. Provision is made for flood warnings. All the constituent authorities have enabling powers under the Act.

The Fylde Water Board Act confirms an agreement between the Fylde Water-Works Company and the Board for the sale and purchase of the Company's undertaking. The agreement forms a schedule to the Act. Fylde Water Board "A" stock is to be issued in payment for the property, to bear 2¾ per cent. interest, and be redeemable in 1950. Rates for domestic supplies range from 7½ to 5 per cent., payable half-yearly. Shipping rates are 1s. for the first 100 gallons, and 6d. for every further 100 gallons, payable in advance. Water is to be supplied to

* See "JOURNAL" for Aug. 22, p. 496.

public bodies for sanitary purposes at 6d. per 1000 gallons; but the Board are not bound to afford these supplies to the injury of the domestic service. Window washing by hose is prohibited without consent. Water is to be efficiently filtered. Streets in the seaside districts are not to be broken up during the summer season. The various constituent authorities may be authorized to collect the rates due to the Board. Section 35 of the Water-Works Clauses Act, 1847, is amended to make the requirement of return not less than 6 per cent. on the outlay, instead of one-tenth, as therein enacted.

The Horsforth Urban District Council Water-Works Act empowers the Council to purchase and carry on the undertaking of the Horsforth Water-Works Company, incorporated in 1865. A clause directs the Company to give the Council and their officers and servants all such information as may be reasonably required respecting the working of the undertaking. The Leeds Corporation are protected. A capital loan of £60,000 is required, repayable in 50 years.

OBITUARY.

The death occurred recently of Mr. J. BILLINGTON BOOTH, who from 1857 to 1880 was a Director of the Preston Gas Company, of which for eleven years he was Chairman. He was in his 79th year.

The death is announced of Mr. PATRICK O'NEILL, who had been for the past four or five years Manager of the Lochmaben Gas Company. Prior to that he was for many years Manager at Lockerbie—first for the Gas Company and afterwards for the Corporation. Two of Mr. O'Neill's sons are gas managers.

Last Wednesday, Mr. DANIEL JENNINGS, of Rotherham, died in his 80th year, after being prominently identified with the temperance movement in all its phases since early in the thirties. Mr. Jennings was long associated with an eminent firm of contractors carrying out extensive works in different parts of the country. Among these was the section of the Manchester Water-Works conveying the water from Woodhead to Manchester. He also assisted in carrying out the first section of the Rotherham Water-Works in 1864, when the filter beds at Ulley were constructed, and mains laid to bring the water from Pinch Mill and Ulley to Rotherham.

PERSONAL.

Mr. ROBERT MORLAND has relinquished his position with the Gloucester Gaslight Company; and his son, Mr. W. S. MORLAND, has been appointed Engineer of the works.

Mr. R. H. SPIKIN has been presented with a handsome marble timepiece by the officials at the Maidstone Gas-Works on the occasion of his retirement from the Company's service.

Mr. C. WINTON, of Comrie, son of Mr. A. Winton, Gas Manager at Grangemouth, has been appointed as Manager of the West Calder Gas Company, in room of Mr. J. DAWSON, transferred to Auchterarder.

The Tiverton Town Council have decided to pay Mr. W. LITTLEWOOD, their Gas Manager, in addition to his present salary, a bonus of 5 per cent. on the profits of the undertaking over and above the sum of £1500 in any one year.

Mr. J. CHALMERS, Manager of the Dunbar Corporation Gas-Works, has sent in his resignation, as he has received the appointment of Manager of the Berwick and Tweedmouth Gas Company. Mr. Chalmers was appointed to Dunbar only last year, when Mr. Richmond went to Kilkenny. In the filling up of the new vacancy, the Dunbar Commissioners are to offer it to the second on the list prepared when Mr. Chalmers was appointed.

The staff and employees of the Saltley and Swan Village Gas-Works, Birmingham, met last Tuesday to take farewell to Mr. J. W. MORRISON, the late Superintendent, who was recently appointed Chief Engineer of the Sheffield Gas Company, and to present h m with a gold watch as a token of their esteem and regard. The chair was taken by Mr. Henry Hack, who said that, while they were all aware of the vast expansion of the Birmingham gas undertakings as a whole, he thought it would be interesting to those present if he particularly related the growth of the Saltley works, with which Mr. Morrison had been for so long connected. He mentioned that the works were started in 1858; and when he (Mr. Hack) first came to Saltley the maximum daily output there was 3½ million cubic feet, and the storage capacity 3 million cubic feet. When Mr. Morrison first became connected with him, in 1879, the daily output had grown to 8 million cubic feet; while now the daily output had reached no less a figure than 14 million cubic feet, and the storage, including the new holder, which was now completed, was 18¾ million cubic feet. Mr. Hack touched upon the great changes which had taken place in the methods of carbonizing, the introduction of the carburetted water-gas plant, the substitution of eight-hour shifts for twelve hours (coupled with reduced work and a general rise in wages), and the general improvement in the position of the employees of all grades; and he took the opportunity of acknowledging the help which Mr. Morrison had rendered him in all these extensions and changes. Then, on behalf of the staff and workmen, he handed to Mr. Morrison a handsome gold watch, upon which was engraved: "Presented to J. W. Morrison, Esq., by the Staff and Workmen of the Saltley and Swan Village Gas-Works on his leaving for Sheffield, September 12, 1899." After some remarks by others present, Mr. Morrison suitably acknowledged the gift; thanking the subscribers for their present, and their kindness and good wishes. He stated that he should always look back to his long connection with the Saltley works with the greatest pleasure. Mr. Hack then introduced Mr. Chaney, Mr. Morrison's successor.

North of England Gas Managers' Association.—In recording the closing proceedings at this meeting in last Tuesday's "JOURNAL," it was intimated that the chair at the dinner given by the Directors of the Newcastle-upon-Tyne and Gateshead Gas Company was occupied by Mr. W. R. Plummer, described as Chairman of the Company. We are asked to mention that Mr. Plummer is a Director only of the Company, and at the request of the Board presided at the dinner in the unavoidable absence of the Chairman and Vice-Chairman.

"The Chemical Trade Directory."—A section of our readers will be interested in the first issue of this work, containing as it does a list of chemical manufacturers, merchants, agents and brokers, assayers and analysts, and makers of chemical plant and materials in Great Britain and Ireland. It is published from the office of the "Chemical Trade Journal," Blackfriars Street, Manchester (price 21s.); and Messrs. Davis Bros. have aimed at producing a volume which should be a real help to all interested in the business side of manufacturing chemistry.

Masonic.—It will be a source of gratification to those of our readers who were good enough to respond to the appeal made to reserve their votes at the last election of the Masonic Institution for Girls in favour of May Hunter (one of the daughters of the late Mr. Robert Hunter, of Chester), to learn that she was last Thursday elected sixth out of a list of 33 candidates for 16 vacancies in the school. As a matter of fact, more votes were polled in her favour on Thursday than for any other candidate. All the other candidates who had a greater number of votes to their credit at the close of the poll that day had been brought forward from previous elections, and so had certain votes standing to their credit. Mrs. Hunter desires us to thank her many friends for their help towards so satisfactory a result.

The Glasgow Gasholder Contract.—In last week's "Notes from Scotland," a paragraph appeared, mentioning that dissatisfaction had been felt at Glasgow in regard to the slow progress the Barrowfield Iron-Works Company (the Contractors for the new gasholder at the Temple works) had been making towards completing its construction. From information since to hand, we learn that, when the tender for the holder was accepted in October, 1897, it was stipulated that the Contractors were to obtain possession of the tank in April of 1898, and complete their work by the end of the November following. As a matter of fact, they did not get the tank handed over to them until the end of February of this year—that is, about twelve months later than the date originally fixed. Thus the time for completing the holder, even supposing the Company were working under the same conditions as prevailed last year, would not be until November of this year. The state of trade generally, however, as everyone knows, is very different this year, consequent upon the unprecedented difficulty in getting materials from steel works. We are assured there would have been no delay in completing the holder had the tank been finished so as to allow the Contractors to make delivery of the steel-work during last year; and as it is, we learn that the work is nearing completion. We can only conclude by an expression of regret that our correspondent had not the above statement of facts before him at the time he wrote the paragraph, and make this full explanation in simple justice to the Barrowfield Iron-Works Company.

Covered Reservoirs for Water-Works.—As questions sometimes arise as to the advisability of covering reservoirs to protect the water from the heat of the sun and from the influence of light in causing algæ growths, it may be of interest to reproduce from the "Engineer" some particulars respecting the six reservoirs at Pasadena, which are all covered. Five of them have flat roofs; and it is stated that the covering has effected a very material improvement in the quality of the water. The decay of the algæ had formerly rendered the water unusable at times. The sixth and largest reservoir, of 21 million gallons capacity, has now been covered, as last year the water in it was so foul that it could not be used. The reservoir is 330 feet by 540 feet, and about 18 feet deep, the sides and bottom being lined with concrete. The posts which support the roof are 2-inch water-pipes, coated with asphalte, spaced 18 feet apart longitudinally and 15¾ feet transversely. On each post is a corbel 30 inches long, supporting the ends of joists, 4 inches by 10 inches and 18 feet long, laid north and south. Each joist is made of two planks, with overlapping ends, making a continuous beam. Across the joists are lighter ones 6 feet apart, also lapping each other and spiked together. Upon the joists are roof-boards from 12 to 24 feet long; and across them, directly over each joist, are nailed wooden strips which prevent warping. The timber used is Oregon pine. The total cost of the work, including labour and engineering, was £1447, or 2·18d. per square foot for the 166,000 square feet of roof.

NOTES.

Modern Lighthouse Practice.

The development of artificial lights for lighthouse use is the antithesis of ordinary artificial lighting. It is interesting to note what can be done to magnify the visibility of the light itself, when this is the object to be attained by applying the sciences of optics and physiology. To French lighthouse engineers appears to be due the adoption of optical apparatus embodying the principle of the "lightning flash," whereby the duration of the exhibition of the light is limited to the minimum of time necessary for its perception by the human eye. This principle was well known to English science 25 years ago; and Lord Kelvin, in 1881, stated that the period in question is 0·10 second. It appears to have been left to the French specialists to make use of this principle to the fullest possible extent, in combination with the most powerful optical apparatus and the most intense lights. Originally confined to electric arc lights, with which an observed intensity of 22 millions of candles has been obtained in the beam, the arrangement is now used in connection with incandescent gas-burners. Experience has not yet pronounced the final judgment on the system; the opinion of many nautical men being that the French have carried the reaction against the old style of slow flash too far. It is stated that the objection against the extremely short duration of the lightning flash is being met in some French lighthouses by repeating the flash rapidly enough to make it show continuously all round. It would be instructive to learn if the vibrating character of these flashes tends to enable the seamen to pick up the lights easier, and take bearings from them more reliably than with the old constant or slow-flashing lights.

The Capabilities of Mica.

Attention is drawn by some newspapers to the undeveloped capabilities of mica as a low conductor of heat. It is remarkable that mica in sheets is used for stove and furnace fittings with diametrically opposite purposes. It is employed to cover the peep-holes of furnaces where it is wanted to stand an extreme heat. For this purpose, its imperviousness to radiant heat and its incombustibility render it well adapted. On the other hand, mica windows are contrived for some makes of warming stoves, in order to give the appearance of a radiant effect without the reality, because, as a matter of fact, the iron parts of the stove radiate more heat than the transparent mica. There is a great deal of mica "waste" produced in different parts of the world; huge heaps of it existing in Cornwall, where it is washed out of the china clay. Being in the form of small flakes, little or no use for this material has hitherto been found. It is suggested that it would form an excellent substitute for asbestos, or slag wool, as a boiler or stove packing. In the construction of gas-stoves, use is largely made of slag wool as a non-conductor of heat; but the material is suspected of having a corrosive effect upon the metal in contact with it, especially if it gets damp. Mica in powder is quite neutral, and therefore non-corrosive. Its well-known property of resisting radiant heat also renders it useful as a coating for structures exposed to the sun or to furnace heat. Altogether, the attention of engineers and manufacturers may well be directed to this little-known substance. It is stated that not 5 per cent. of the yield of the mica mines can be had in the form of those comparatively large transparent sheets in which engineers commonly know the material. Consequently there is a large supply of it in the form of powder or flakes suitable for working up for all purposes in which transparency is not a requisite.

The Tower Buildings of New York.

A great amount of engineering interest attaches to the expedient of high building construction, by which the housing difficulty is being dealt with in New York. Practically, this means building a town upwards, instead of extending by lateral building; and it has much to recommend it. A recent issue of the "Builder" discusses the principle judiciously, from the point of view of the object which these high buildings are intended to serve, and do serve very efficiently, as testified by their increase in number and growing popularity. Buildings of twenty stories and upwards are becoming common in Broadway, New York, which will speedily exhibit the appearance of a crack in the masonry—like one of the "wynds" of old Edinburgh—the height of the residential and office towers lining it having no reference to the width of the thoroughfare. It is considered by our contemporary that the cities of Europe—more especially of England—will have to make use of the same kind of building in order to accommodate the business that must be done within a limited area. The high building is a town in itself; only its tramroads run vertically instead of along streets. The system brings comfort and convenience up to the highest standard. Telephones fixed to every desk reduce to a minimum the necessary amount of running about. The lighting and heating of all the rooms and passages is done by plant installed on the premises. In short, while imaginative novelists everywhere have been indulging in flights of fancy as to what the character of the architecture of the coming century is to be like, in the United States the town of the immediate future is being realized as a city of towers. Babel, it appears, is coming into fashion again, with the advantages of electric hoists, lights, telephonic connection, and steam heating. There would not appear to be much room for gas in these towers, to judge from contemporary technical publications.

A Pocket Automatic Gas Lighter.

Among all the multitudinous devices that are now being "invented" with the object of making practical use of the familiar property of platinum-black to occlude hydrogen, and so generate sufficient heat to light a coal-gas flame, attention may be spared to a pocket appliance of the kind being offered for sale in "notion" shops. Exteriorly, the article resembles a pocket pen or pencil case; being made of nickeled brass, with an obvious slide band. This, on being moved, protrudes a somewhat fragile-looking arrangement of twisted wire, holding a couple of morsels of some black substance, which might be meerschaum saturated with platinum-black, in physical connection with a wisp of fine platinum wire. The article is sold as a safety lighter for incandescent and other gas-burners; and it illustrates the strength and the weakness of all devices of the kind depending on the action of platinum black in a current of hydrogen. No two of the pocket lighters act exactly alike, so that the salesman who takes them off the card is usually warned to "pick out a quick one." Then, of course, the right position of the sensitive material in the current of gas has to be sought by the process of "trial and error," while the presence of the escaping combustible is making itself manifest to the sense of smell. Eventually, if everything is as it should be, the pieces of sensitized substance become red hot, the attached threads of wire grow hotter, and the gas ignites. The next burner will light in much shorter time. The more frequently the appliance is used, the better it works. It only ignites argand burners from the top with difficulty, apparently owing to the cooling effect on the small wires of the uprush of gas and air overbalancing the heating power of the platinum black. Here again, however, rapid repetition of the experiment conduces to success. If the lighter remains out of use for some days, it is sluggish at starting. This appears to militate against the success of the whole system.

A Fire-Proof Clinker and Breeze Floor.

A remarkably successful use of gas-works clinkers, or pan breeze, in the construction of a fire-proof floor is recorded in No. 23 of the British Fire-Prevention Committee's Report. It is worth special note, as the result was that after a test of 2½ hours' firing, and flooding with water immediately afterwards, the floor remained intact as far as its structural strength was concerned. The floor was made of reinforced concrete, carried upon steel joists. Before the floor was constructed, cover-pieces for the underside of the joists were prepared, of very fine cinders, sharp washed sand, and portland cement, in the proportion of four of cinders, two of sand, and one of cement; 4 gallons of water being used to every 3 cubic feet of material. The whole was turned over and mixed, four times dry and four times wet. The slabs were hung up to the joists by strips of hoop iron embedded in them. Some pieces of No. 10 galvanized iron wire were also buried crosswise in the slabs, forming a network. The concrete for the flooring was composed of clinkers from the Kensal Green Gas-Works, broken to pass a ¾-inch mesh. The sand was sharp pit sand, washed. The cement was not specially selected. The concrete was gauged and mixed as already specified, with 28 gallons of water to 1½ yards of material. It was laid 4 inches thick. The clinkers were dry, and the sand slightly damp, at the time of mixing. The concrete was carried to the floor in buckets, and well rammed down and trodden upon the centering. When this was set, 2-inch by 3-inch flooring-fillets were laid upon it, filled in between with coke breeze concrete 2 inches thick; making it flush with the top of the flooring-fillets. The ceiling below was plastered ⅞-inch thick. After all was done, and tested by a fire so fierce that at one time the heat rose to 2335° Fahr., the result was that about one-third of the plastering fell off and exposed the concrete; but the whole of the concrete itself remained sound and good, and was not disintegrated at any point.

Mason's Refuse Gasifier.

At the recent exhibition of sanitary appliances in connection with the Public Health Congress at Blackpool, considerable interest was aroused by the successful working of a Mason's refuse gasifier. The manifold advantages of adapting the principle of the gas-generator and furnace to the destruction of town's refuse, must be evident to those who know what gas-producers have effected in other respects. It is claimed for Mason's destructor cell (Duff's patent) that it is a successful realization of this principle for the gasification and incineration of ordinary town's refuse without the slightest attendant nuisance. This result is attained in the simplest manner, and may be secured with a single cell. The plant is an ordinary gas generator or producer, built of iron plates with a fire-brick lining. It has a hopper-and-bell opening at the top for charging, and is entirely open at the bottom; being carried on girders over a water-trough, which is made to seal the interior. The grate is in the form of a steep ridge running from side to side of the producer. The elements of the arrangement are, in brief, just the same as those that go to the design of the majority of the gas-retort furnaces actually in operation. The primary air is injected under the ridge grate by a steam-jet. The gas produced is led into a supplementary chamber, where it is ignited by the aid of a supply of secondary

air previously warmed by circulating round the chamber in a jacket. Of course, the heat of the burning gas can be utilized in various ways, as in steam raising. The standard size of cell is about 49 square feet in area, and works with a 4-foot depth of rubbish fuel. At the yard of the Moss Side Urban District Council, with a single cell of 31·25 square feet area, a test was recently made under the supervision of Mr. D. Ainley, the Superintendent. The refuse contained 30·3 per cent. of moisture, and was used as collected, without screening or sorting. It was completely burnt at the rate of 13,552 lbs. in 24 hours; leaving 25 per cent. of clinker and ash. The heat of the gases, if utilized in steam raising, would yield a duty of 1 lb. of water evaporated per pound of rubbish consumed. The whole arrangement appears to be an excellent one.

COMMUNICATED ARTICLES.

DIMENSIONS OF GAS PLANT.

By Ernest J. Sutcliffe, of Bradford.

It has many times occurred to the writer, on occasions when it has been necessary to refer to such matters in the literature connected with the gas engineering profession, that, in what may be termed the constants in formulæ respecting the size of gas plant in proportion to the work required of it, very great variations of opinion have been from time to time expressed by different engineers; and he has lately tabulated these various opinions under the proper heads for purposes of comparison. These are given below, in the hope that they may prove useful for other purposes than that for which they were compiled.

The date of expression of each opinion is stated, as is also the name of the town in which the authority was engaged at the time. (In one or two cases it is not given, for obvious reasons.) This latter point is one which is of more importance than it may at first sight be deemed, as in different districts the conditions vary greatly from one another. For instance, in a town in close proximity to the coalfields, it is probably unnecessary to have coal-storing capacity approximating that which is considered essential in another situated at a distance from the pits, and dependent for its coal supply by boat upon many circumstances which may interfere with and interrupt it. In a non-manufacturing district it is usually granted that additional holder room is required beyond that which would be sufficient in a purely residential town. Again, the coals used, or rather the amount of the compounds of sulphur given off by them on distillation, and the fact of being placed under the sulphur clauses or not, make the requisite extent of purifying area a very variable quantity in different parts of the country. These and other similar factors ought to be taken into consideration in dealing with figures of this character; and it is in order that the conditions under which each opinion was given may be better understood, that the names of the towns are stated. It may, perhaps, be advisable to mention that the figures given by Mr. W. R. Chester refer to works of a maximum productive capacity of $3\frac{1}{2}$ million cubic feet per day; while those of the late Mr. V. Wyatt relate to one of 6 millions capacity.

Land.

V. Wyatt, 1887, London.—Two-and-one-third acres per million cubic feet maximum production per day; but get 3 acres if possible.

W. R. Chester, 1892, Nottingham.—Two acres per million cubic feet maximum production per day.

Coal Storage.

"King's Treatise," 1878.—Six weeks' maximum consumption.

D. Clark, 1884, Ashton.—Eight weeks' maximum consumption.

W. Carr, 1884, Halifax.—Six weeks' maximum consumption.

J. M'Gilchrist, 1891, Dumbarton.—Three winter months' consumption.

R. Mitchell, 1891, Edinburgh.—One winter month's consumption at least.

J. Carter, 1891, Lincoln.—One-and-a-half to two winter months' consumption at least.

C. A. Craven, 1891, Dewsbury.—One-and-a-half winter months' consumption.

T. Duxbury, 1891, Darwen.—One-sixth to one-fifth of a year's consumption.

W. W. Hutchinson, 1891, Barnsley.—Two months' maximum consumption at least.

S. R. Ogden, 1891, Blackburn.—Two to three months' maximum consumption.

C. E. Jones, 1891, Chesterfield.—Three to four months' maximum consumption is not at all outrageous.

J. W. Helps, 1891, Croydon.—Two months' maximum consumption should be the minimum.

W. R. Chester, 1892, Nottingham.—One months' maximum requirements, or 8 square yards per ton per day.

T. Newbigging, 1898.—Six to eight weeks' maximum requirements.

Coke Storage.

W. R. Chester, 1892, Nottingham.—Fourteen days' maximum make, or 7·4 yards area per ton per day maximum.

Tar and Liquor Storage.

C. S. Ellery, 1884, Bath.—Six to eight weeks' maximum production as the minimum capacity.

H. Hack, 1884, Birmingham.—Six weeks' maximum make is sufficient.

V. Wyatt, 1887, London.—850 gallons per ton per day (maximum); but this may usefully be extended to 1000 gallons.

A. Colson, 1891, Leicester.—Four weeks' maximum make.

W. R. Chester, 1892, Nottingham.—Four weeks' maximum make.

H. O'Connor, 1897.—Should be of capacity to hold 1000 gallons per ton per day (maximum).

T. Newbigging, 1898.—Six weeks' maximum make.

Condensers (Atmospheric).

S. Clegg, 1866.—6¼ square feet per 1000 cubic feet maximum make per day.

"King's Treatise," 1878.—10 square feet per 1000 cubic feet maximum per day, measured from the hydraulic main.

V. Wyatt, 1887, London.—33 cubic feet capacity or 50 square feet of surface per ton per day (maximum).

C. Hunt, 1888, Birmingham.—6 to 8 square feet per 1000 cubic feet per day (maximum) according to the length of main from the hydraulic main.

W. R. Chester, 1892, Nottingham.—4·12 cubic feet or 13·31 square feet per 1000 cubic feet per day (maximum); time contact of six minutes is barely sufficient.

W. R. Herring, 1892, Huddersfield.—With wrought-iron mains, calculated from the hydraulic main, 5 square feet per 1000 cubic feet per day (maximum).

Reissner, 1895, Berlin.—4·56 square feet per 1000 cubic feet maximum make per day.

H. O'Connor, 1897.—150 to 200 square feet per 1000 cubic feet maximum make per hour.

T. Newbigging, 1898.—10 square feet per 1000 cubic feet maximum make per day.

Scrubbers.

V. Wyatt, 1887, London.—100 cubic feet per ton per day (maximum); time contact of 15 minutes.

W. R. Chester, 1892, Nottingham.—Scrubbers and Washers, 4·1 cubic feet per 1000 cubic feet maximum make per day; time contact, six minutes.

W. R. Herring, 1892, Huddersfield.—9 cubic feet per 1000 cubic feet make per day (maximum).

Reissner, 1895, Berlin.—6 cubic feet per 1000 cubic feet make per day (maximum).

H. O'Connor, 1897.—120 cubic feet per ton of coal per day (maximum).

T. Newbigging, 1898.—9 cubic feet per 1000 cubic feet make per day (maximum).

Revivifying Space.

V. Wyatt, 1887, London.—The total area of the lime and oxide sheds should equal half that of the purifying-house proper, for purposes of lime preparation and oxide revivification, or a floor area of 25 square feet per ton per day.

W. R. Chester, 1892, Nottingham.—The area of new and spent lime sheds should equal 1·1 square feet per 1000 cubic feet maximum production per day.

Purifiers.

G. R. Hislop, 1874, Paisley.—2 square feet area per 1000 cubic feet per day maximum.

"King's Treatise," 1878.—9 square feet area per 1000 cubic feet per day maximum.

F. Livesey, 1883, London.—Maximum daily make in thousands multiplied by 0·4 = area of each purifier.

H. Woodall, 1883, Leeds.—*All lime purification.* For Durham coals, a total area of apparatus in use at one time of 1·25 square feet for each 1000 cubic feet maximum daily make. For Yorkshire and North Staffordshire coals, 1·50 square feet are required.

L. T. Wright, 1883, London.—*With Beckton method of eight boxes,* an area of 0·4 square foot per 1000 cubic feet for each box is liberal.

V. Wyatt, 1887, London.—133 cubic feet total internal capacity of vessels per ton per day (maximum); time contact, 15 minutes; sieve area, 100 square feet. Taking top area on plan of one purifier of a series, an allowance of 3 square feet per ton per day is sufficient.

C. Hunt, 1888, Birmingham.—*Oxide first, lime after.* Each purifier should have an area of not less than 4 square feet per 1000 cubic feet maximum make per day.

W. R. Herring, 1892, Huddersfield.—Maximum make per day multiplied by 0·5 = area in square feet of each purifier.

W. R. Chester, 1892, Nottingham.—*Lime and oxide in alternate boxes.* An area of 2·44 square feet, or capacity of 14·19 cubic feet per 1000 cubic feet per day (maximum); time contact, 20 minutes.

Reissner, 1895, Berlin.—*With four oxide boxes.* 1·17 square feet per 1000 cubic feet per day.

Kunath, 1896.—Gas should not pass through the purifiers at a greater speed than a foot per minute.

H. O'Connor, 1897.—Each 2000 cubic feet maximum make per day require 1 foot area for each purifier; 1 square yard of grid for each 1000 cubic feet maximum make per day. *With no sulphur clauses in force,* the cubical contents of all vessels should equal 15 minutes' maximum make.

T. Newbigging, 1898.—*With four purifiers, three always in action.* Maximum daily make in thousands multiplied by 0·6 = area of each purifier in square feet.

GAS STORAGE.

C. A. Craven, 1873, Dewsbury.—One day's maximum consumption.

S. Hunter, 1873, Rochdale.—Minimum capacity should be equal to 75 per cent. of the maximum day's consumption.

R. Hunter, 1884, Stalybridge.—In manufacturing districts, two days' make; in non-manufacturing districts, one day's make.

T. Newbigging, 1885.—One-and-a-half days' maximum make.

C. E. Jones, 1885, Chesterfield.—One day's maximum consumption is a very fair allowance.

H. Veevers, 1885, Dukinfield.—Two days' maximum consumption.

T. Moore, 1885, Macclesfield.—Anything less than one-and-a-half days' consumption would be unwise.

T. B. Ball, 1885, Rochdale.—24 hours' maximum consumption is quite as much as need be provided for.

W. R. Chester, 1885, Manchester.—One-and-a-half days' maximum make.

J. Chadwick, 1885, Oldham.—24 hours' maximum consumption is quite sufficient in a manufacturing town.

W. Carr, 1885, Halifax.—Storage equal to the heaviest day's consumption is a pretty safe margin.

J. Chew, 1885, Blackpool.—36 hours' maximum consumption.

J. Paterson, 1885, Warrington.—125 per cent. of maximum day's consumption will generally be ample.

V. Wyatt, 1887, London.—An average December day's make; but in manufacturing towns this should be increased to one-and-a-half days.

C. Hunt, 1888, Birmingham.—Should be at least equal to three-fourths of the maximum daily make; but for manufacturing towns a much higher proportion is generally allowed.

C. Hunt, 1891, Birmingham.—The old idea of 80 per cent. is insufficient. The more one could have the better.

H. O'Connor, 1897.—A maximum day's make is none too much.

T. Newbigging, 1898.—At least 24 hours' maximum make.

WORKS MAINS.

V. Wyatt, 1887, London.—The sectional area of main should be not less than 150 square inches per million cubic feet maximum make per day; or 1½ square inches per ton per day (maximum).

Reissner, 1895, Berlin.—In mains of 36 to 40 inches diameter, the gas should have a velocity of about 9·84 feet per second. With smaller mains, its velocity should be from 6·56 to 9·84 feet per second.

H. O'Connor, 1897.—The author gives the following diameters of mains according to make, but says the mains up to the condenser should be at least 25 per cent. larger:—

Make per Day in Thousands.	Make per Annum in Millions.	Diameter of Main in Inches.	Make per Day in Thousands.	Make per Annum in Millions.	Diameter of Main in Inches.
22	4	4	580	105	18
31	5¾	6	720	130	18
65	12	8	830	150	18
115	21	10	865	156	18
208	38	12	900	165	20
285	50	14	1050	190	20
325	60	14	1100	200	20
370	68	16	1300	240	24
470	85	16			

EQUALITY IN THE SUPERVISION OF GAS AND ELECTRICITY SUPPLIES.

By AMICUS.

It is peculiarly interesting to an unprofessional observer to note how in some respects history in gas supply is repeating itself in connection with electric lighting. Complaints of "bad" or deficient supply of electricity are becoming more and more frequent, just as the quality and the pressure of gas have been—more often wrongly than rightly—the subjects of grievance. "Wrongly" because, fenced round so thoroughly by examinations and penalties, it is difficult for a gas company to transgress without being found out, and brought before the local administrators of the law. And now that local authorities are so generally becoming competitors in lighting with gas companies, it will behove the latter to maintain, if possible, even a more rigorous watchfulness over their manufacturing operations, for any lapse or defect will, no doubt, bring down upon them the full weight of the legal authority with which their competitors are, it appears to the writer, unfairly invested.

The competition in lighting has entirely changed the relations of gas suppliers and the guardians of the consumers. Therefore in those towns in which the electricity supply is in the hands of the local authority, and the gas supply is furnished by a company, it only seems fit and proper that the watch which the former have the power to set over the latter should now be transferred to an independent body, to whom also should be given the right to look after the interests of the users of electricity. Or in a small town, and in places where the expense of such a course might be a matter for consideration, why should not the local authorities continue their supervision over the gas supply, and the gas suppliers be clothed with authority to exercise a similar surveillance over the electricity supply? This suggestion may be regarded as an extraordinary one, and may even raise a smile; it will certainly be met with ridicule by local authorities. But why? If the position is examined impartially, it will be seen that it would only be placing the competitors on an equitable level in regard to the guardianship of their respective customers. The customers themselves might have something to say on the matter. However much faith they had hitherto put in their local governors, they might be illiberal enough to hint at such an equality in supervision begetting collusion. It may be conceded that a feeling of mutual respect would be created; but any little leniency there might be at first between the parties would soon be corrected by the keenness of the competition which now exists, and must in the nature of things continue to exist. Anyway the present conditions of supply favour one illuminant more than the other; and the supervision over one of them which may in the past have been just enough is now no longer so. The relations of the supervisors and suppliers having changed to those of competitors, the authority of the former over the latter should be abrogated, or the two should be placed on an equal footing. Under the circumstances, equality is a right, and should be striven for.

These thoughts occurred to the writer after reading some observations on the minutes submitted by the Lighting and Electricity Committee at a recent meeting of the Croydon County Council. One of the councillors, Mr. Hillier, who resides at South Norwood, stated that, "often in his own premises when the electric light was burning, they had to have gas by the side of it. There was not enough force of current." The councillor's diction may not be altogether without fault; but it gives one the impression that he was—notwithstanding anything said with the view of absolving the supply of electricity from blame—representing the actual state of the electric service to his establishment. The prudence of the councillor is also shown by the fact that he did not discard his gas-fittings, and that they were available, and the ever-reliable gas, in the hour of his need. Speaking for the Committee, Mr. Hinton asserted that "in every case of complaint in private lighting, they found it was the fault of the lamps." Are the customers of the Electrical Department of the Croydon Corporation to accept the *ipse dixit* of Mr. Hinton without question or further proof? When a gas company on a complaint of "bad gas" affirm that the want of light is due to defective burners or fittings, they can, where the local authority have examinations made of the gas supply, produce in support of their assertion the results of those tests. What a fine thing it would be for a local authority supplying electricity if they could, when complaint was made, in a like manner produce the declaration of the local gas company, or of an authority independent of themselves, that the supply of electric current was up to the requisite standard. The interests of the electricity consumer should be protected with just as much exactitude as are those of the gas consumers. Then, on all hands, equality and fairness in supervision are desirable, and should certainly be sought after.

American Gaslight Association.—The Secretary of the Association (Mr. A. E. Forstall) has issued a general announcement with reference to the annual meeting, which will be held in New York City, on Wednesday, Thursday, and Friday of this week. There will be six papers on a variety of topics of current interest to the gas profession. One of them will be by Mr. A. G. Glasgow (of Messrs. Humphreys and Glasgow) on "Carburetted Water Gas as a Coal Gas Auxiliary." Among other subjects to receive attention will be interior illumination, the steam consumption in a water-gas plant, the pumping of gas, and prepayment meters. A lecture will also be delivered by Dr. Henry Morton, President of the Stevens Institute of Technology, Hoboken, on "Recent Development of Artificial Illumination." The business sittings will only occupy the mornings; and for the afternoons and evenings a social programme has been arranged.

TECHNICAL RECORD.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

The October meeting of the members of the Association was held on Saturday, when a party of about thirty paid a visit to the works of Messrs. J. & J. Braddock at Oldham. On arrival, they were met by Mr. Robert Braddock, Mr. Hawkyard, and Mr. Taylor, who gave them a hearty welcome. For convenience, the party was split up into three, and in this manner wended their way through the extensive establishment. At the conclusion of the visit, Mr. R. H. Garlick, the President, moved a hearty vote of thanks to Messrs. Braddock, also to Mr. Hawkyard and Mr. Taylor, for the kind manner in which the members had been received and for the way in which they had explained everything, and thrown their works open for inspection. Mr. C. Berry, the Vice-President, seconded the motion, and it was adopted and duly acknowledged.

In the evening, the members met at the Technical School, Manchester, where a paper should have been given by Mr. Frank West, on "Revivification;" but Mr. West was unavoidably absent. An exceedingly good substitute, however, was found in Mr. G. B. Lewis, of the Crystal Palace District Gas Company, who came forward with a paper on "Cyanogen." He said that for the last four or five years the presence of cyanogen in coal gas had been an object of a good deal of investigation, as to whether it could be abstracted, as cyanides, from a profit point of view. He explained a few methods which he said were entirely due to the gold industry. But the chief objections to these were on account of the considerable wear and tear of the special plant that was required. He went on to explain how the presence of cyanogen was supposed to have been caused by the ammonia in the retort coming in contact with the hot carbon, forming hydrocyanic acid; but this re-action was still in dispute. It had also been stated that the cyanogen existed in the form of ammonium cyanide; but there was still some doubt as to this being so, as it could not very well exist at the temperature of the retort. But as long as cyanogen was present, what gas managers wanted to know was what could be done with it. He thought the best thing was to convert it into one of the cyanide compounds; and he discussed the advantages of each for the unit weight of cyanogen in the gas, and the best method to use for its extraction.

A short discussion followed the paper; and a hearty vote of thanks was conveyed to Mr. Lewis for having come forward to give his valuable and interesting paper. This brought the day's proceedings to a close.

The next meeting will be held on the 18th prox., when the New Abram Cannel Mine of the Moss Hall Coal Company will be visited.

THE PAPERS READ AT THE ACETYLENE CONGRESS.

The report by Herr F. Liebetanz, of Düsseldorf, of the proceedings at the Second International Acetylene Congress at Buda-Pesth, on May 20 to 24 last, has been forwarded by the author; and from it we are able to give the following abstract translations of the more important papers read at the congress. Herr Liebetanz's original report has appeared in recent numbers of the "Zeitschrift für angewandte Chemie."

The Honorary President of the Congress was Herr Hegedüs, the Minister of Commerce; while the following were elected to act in turn as President on the successive days of the meeting: Councillor Dr. von Wagner, of Buda-Pesth; Counsellor Dietrich, of Dresden; Professor Lewes, of Greenwich; M. Kieffer, of Paris; and Herre Leffler, of Stockholm. Paris was chosen as the *venue* of next year's congress.

Herr V. Berdenich, of Buda-Pesth, gave an interesting account of the exhibition, which had been opened a week prior to the commencement of the congress. Of the 90 exhibitors, 33 came from Austria-Hungary, 24 from Germany, 17 from France, 4 each from England and Italy, 3 from Switzerland, 2 from Sweden, and 1 each from Croatia, Holland, and Roumania. Eighty generators were shown, of which the majority were of the general type in which carbide is dropped into water; and the greater number were intended to act automatically. Some were of very simple design, others extremely complex. There was a great variety of acetylene lamps, both for table use and for vehicles. A distinct improvement was observable in acetylene motors since the preceding year. The carbide industry was well represented by an apparatus for the production of carbide by a new process, a model carbide furnace, and numerous samples of carbide and diagrams. The exhibition was lighted by 2600 burners, having an aggregate illuminating value of about 80,000 candles.

M. Gustave Gin, of Paris, presented a paper on "Energy," in which he described the production and accumulation of power in Nature. His communication had no special reference to the acetylene or carbide industry.

Herr Liebetanz, of Düsseldorf, read an exhaustive paper on the "Cost of Production of a Ton of Carbide by Various Sources of Power." We hope to give shortly a nearly full translation of this interesting communication, which is not susceptible of brief abstraction.

M. Guilbert, the Chemist to the Western Railway of France, gave a paper on "Trials made with Mixtures of Acetylene and Various Gases for the Lighting of Railway Carriages." The trials had been made in the laboratory of the French Railway Company; and their object was to ascertain whether mixtures containing acetylene could replace oil gas at a moderate price. Several burners were tested. The batswing and butterfly types of burners were found to be superior to Manchester burners for the consumption of mixtures of acetylene and other gases. The general conclusions drawn from the trials were that a mixture of oil gas and acetylene containing 25 per cent. of the latter had only twice the illuminating value of the oil gas; and that a mixture of coal gas and acetylene containing from 40 to 50 per cent. of the latter was preferable to any other acetylene mixture. A mixture of equal volumes of acetylene and nitrogen was found to be about equal to oil gas in illuminating power. The cost of production of the compressed mixture of coal gas and acetylene was calculated for different proportions of the two gases, in the manner shown in the following example: Carbide costing about £26 8s. per ton is capable of yielding 4·8 cubic feet of acetylene per pound; and therefore 1000 cubic feet of acetylene cost for carbide only £2 9s. 2d. The cost of production of the acetylene is about 5s. 10d. per 1000 cubic feet, making a total cost for material and manufacture of £2 15s. per 1000 cubic feet. The cost of coal gas is taken at about 3s. 5d. per 1000 cubic feet; and the cost of compressing a gas to 9 atmospheres pressure, at 5s. 1d. per 1000 cubic feet. Therefore 1000 cubic feet of a mixed gas of the following composition costs as follows:—

600 cubic feet of coal gas at 3s. 5d.	=	2	0½
400 " " acetylene at £2 15	=	1	2 0
Compression		5	1
Total cost	=	£1	9 1½

Calculations on the same basis as the above showed that a mixture of about 6 volumes of coal gas with 4 volumes of acetylene was the most suitable mixture containing acetylene for use in place of oil gas for railway carriage lighting. It had about double the illuminating value of oil gas.

A paper by Professor F. Ahrens, of Breslau, on the "Purification of Acetylene," was read by Dr. Scheel. The author pointed out that when carbide was gradually discharged into a large excess of water, the acetylene was not liable to be decomposed or overheated, and was free from other hydrocarbons, hydrogen, ammonia, and sulphuretted hydrogen. In whatever manner acetylene was generated from carbide, however, it contained organic sulphur compounds, phosphuretted hydrogen, and probably also organic phosphorus compounds. The removal of phosphuretted hydrogen was especially troublesome. For its detection, Bergé's reagent—consisting of 10 parts of corrosive sublimate dissolved in 80 parts of 30 per cent. hydrochloric acid—was suitable, as the phosphuretted hydrogen formed therein an amorphous precipitate, whereas the double salt which was formed from acetylene in this solution consisted of needle-like crystals. The garlic-like odour, and the colour of the flame, however, were certain indications of phosphuretted hydrogen in acetylene. Of the proposed purifying agents, chloride of lime was first suggested by Lunge and Cedercreutz; and Wolff subsequently introduced a material in which lead chromate was mixed with the chloride of lime. The author did not find the lead chromate in the material of any service. Wolff's material had a high duty as a purifying agent; for at a rate of flow of rather less than 1 cubic foot of acetylene per hour, 1 lb. of the material removed all sulphur and phosphorus compounds from 288 cubic feet of the gas. The acetylene, however, thereafter contained traces of carbonic oxide and chlorine. A. Frank's purifying agent—consisting of cuprous chloride dissolved in hydrochloric acid—was applied directly in scrubbers; or, for small installations, indirectly by means of kieselguhr saturated with it. The saturated kieselguhr was of a light brown colour. One pound of this material began to work imperfectly after 80 cubic feet of acetylene had passed through it. It removed not only the phosphuretted hydrogen, but also the sulphuretted hydrogen and the ammonia. The author did not think the formation of explosive copper acetylide a likely contingency. The material turned dark brown as it became exhausted. Frank's solution was found to arrest all the injurious impurities of acetylene, and to effect no change on the latter gas; but it retained a certain amount of it, owing to the formation of a double compound—$C_2H_2Cu_2Cl_2$. Ullmann's purifying agent—consisting of acidified solution of chromic acid—was used in the liquid state only in large installations. For small plants, kieselguhr saturated with the solution was employed. This material was of a bright yellow colour, which changed to a dirty green as it became exhausted, though the original colour returned on exposure of the spent material to the air. Ullmann's purifying material answered well. Bunte and Wachs had found that the chromic acid in the solution was exhausted at the rate of 1 lb. for every 2910 cubic feet of acetylene purified.

Dr. N. Caro followed with a paper covering the same ground as Herr Ahrens's communication, but dealing also with the impurities in the carbide. These impurities, he said, contained either sulphur, phosphorus, or nitrogen. Sulphur occurred in

carbide chiefly as calcium sulphide, calcium carbosulphide, and aluminium sulphide, of which the first two compounds were derived either from calcium sulphate in the lime employed or from sulphur in the coal used in the manufacture of the carbide. Both these compounds could be reduced to a very small quantity in the carbide, as, at the temperature of the electric furnace, carbon broke them up, with formation of calcium carbide and sulphuric or sulphurous acid. Aluminium sulphide was produced whenever alumina and sulphur occurred; but its quantity might likewise be kept down, as excess of carbon broke it up and formed with it calcium carbide and sulphur. The sulphuretted hydrogen formed from these three impurities in the course of the generation of acetylene, was retained by the lime sludge when the temperature was low; but when the temperature was high, it reacted with the acetylene and with the condensation products of the latter, and formed therewith organic sulphur compounds. Sulphur oil and mercaptan were two such compounds which had been detected. When the generation of acetylene was effected by projecting carbide into water, the sulphuretted hydrogen remained for the most part in the lime sludge; but when the gas was generated by the fall of water on to carbide, a greater quantity of sulphur products was produced, and these for the most part escaped with the gas in the forms of sulphuretted hydrogen and organic sulphur compounds. Phosphorus was the second important constituent of carbide which gave rise to impurities. It was derived either from calcium phosphate in the chalk or from phosphorus compounds in the coal. It occurred in the carbide in the form of calcium phosphide, which at the temperature of the electric furnace and in the presence of an excess of carbon was split up into calcium carbide and phosphorus, which volatilized. This property of the phosphide made it possible to produce carbide containing but little phosphorus from raw materials which were rich in it, provided the product was well fused with an excess of carbon. Calcium phosphide had the property of being decomposed by water with the formation of calcium hydrate and phosphuretted hydrogen. A series of researches and observations went to show, however, that the phosphuretted hydrogen, formed from phosphide made at the temperature of the electric furnace, was not liable to spontaneous ignition. This fact, however, would not preclude the possibility of a mixture of air and acetylene being ignited owing to the phosphuretted hydrogen, if the quantity of the latter were sufficient for its oxidation to give rise to the heat necessary for ignition. The phosphuretted hydrogen resulting from the decomposition of the phosphide present in the calcium carbide passed into the gas, whatever was the method of generation employed. If, however, the temperature during generation were low, the phosphuretted hydrogen formed was nearly pure; but if the temperature were high, organic phosphorus compounds were found along with it. In generators in which carbide was projected into water, 82 per cent. of the total phosphorus was found as phosphuretted hydrogen, and 0·2 per cent. as organic phosphorus compounds in the acetylene; while the remaining 17·8 per cent. must have been retained by the residual sludge. In generators in which water was dropped on to carbide, 52·2 per cent. of the phosphorus was found as phosphuretted hydrogen, 14·3 per cent. as organic volatile phosphorus compounds, and 2·1 per cent. as organic non-volatile phosphorus compounds in the acetylene—leaving 31·4 per cent. in the residual sludge. From these results, it appeared that, so far as phosphorus impurities were concerned, there was little to choose between the two classes of generators; for whereas the one formed difficultly removable organic compounds of phosphorus, the other caused a greater total quantity of phosphorus to pass into the gas. The third constituent of carbide responsible for impurities was nitrogen, which occurred in it as calcium nitride. This was chiefly derived from the nitrogen compounds in the coal. Calcium nitride was decomposed by water; and ammonia and calcium hydrate were thus formed from it. The fusion of carbide produced no cyanide. This could only be formed in the outer layer of carbide by the action of the air during cooling. Bamberger had erroneously assumed that the formation of ammonia in acetylene was due to the presence of cyanide in the carbide. In generators in which carbide was projected into water, over 90 per cent. of the ammonia produced was retained by the water; but in those in which water was dropped on to carbide, a considerable amount of ammonia formed compounds with the sulphuretted hydrogen, phosphuretted hydrogen, and acetylene. Neither aniline, pyridine, nor pyrrol were among the compounds found. Carbonic oxide occurred in acetylene obtained by dropping water on to carbide, sometimes to the amount of 2·3 per cent. of the gas. The only purifying agents of any service were three—Wolff's material, Frank's reagent, and Ullmann's reagent. Wolff's material unfortunately needed the prior removal of ammonia, in order that risk of the formation of nitrogen chloride might be avoided. It effected the removal of sulphur and phosphorus compounds, but attacked also the acetylene; so that chlorine compounds and carbonic oxide were found in the gas which had been purified by it, but not in considerable quantities. Frank's solution of cuprous chloride combined with all the impurities of crude acetylene, and did not attack the gas itself. In washers, 1 gallon of the solution sufficed to purify about 2400 cubic feet of acetylene, and after regeneration a further 1200 cubic feet. Even better results were obtainable in well-designed scrubbers. The large excess of acid in the solution precluded any danger from the formation of copper acetylide. Kieselguhr saturated with Frank's solution was known commercially as "Frankolin." Ullmann's reagent, which was a solution of chromic acid in sulphuric acid, gave as good results as Frank's solution. Kieselguhr saturated with it was known commercially as "Heratol." Metal burners, which failed rapidly with unpurified acetylene, were behaving faultlessly after twelve weeks' use with acetylene purified by either Frank's or Ullmann's reagent. They were much corroded after eight weeks' use with acetylene purified by Wolff's material. Stern's method of purification, by means of hydrocarbon or paraffin oils, was useful as an auxiliary to Frank's or Ullmann's method, as it removed from acetylene some sulphur and phosphorus compounds which were unaffected by their reagents. The question of the proper purification of acetylene appeared to have been now completely settled.

Herr A. Grittner, Chemist to the Hungarian State Railway, gave an account of some researches on the "Action of Acetylene on Metals." His conclusions differed from those formerly arrived at by Herr Gerdes. Briefly they were: (1) A compound of acetylene and copper is formed when crude acetylene is passed through a neutral or ammoniacal solution of copper. A yellowish-red precipitate, which contains no copper acetylide, is formed when the copper is in acid solution. (2) Acetylene which is free from ammonia, but unpurified in other respects, attacks copper and its alloys, and forms therewith explosive copper acetylide. (3) Quite pure and dry acetylene does not attack copper and its alloys, though it is possible that, after prolonged action, the formation of copper acetylide may occur also under these conditions.

With regard to the danger of explosion, Berthelot and Vieille have shown that acetylene does not explode unless the pressure is at least 3·23 atmospheres. A mixed gas containing 30 per cent. of acetylene would not, therefore, explode under 6 atmospheres pressure, as the partial pressure would not exceed the above limit. If air is not mixed with acetylene in proportions within the explosive limits, and if phosphuretted hydrogen is removed from the gas, there would therefore be no danger of explosion in ordinary acetylene installations for lighting. The chief point which needs attention is the exclusion of air from the gas. Compression of mixed gas containing 30 per cent. of acetylene, to 10 atmospheres, is dangerous.

(To be concluded.)

JOINTS FOR CAST-IRON PIPES.

The following observations on the above subject appeared in a recent number of the "Metal Worker."

There is probably no more inviting field now open to the inventor than that which is created by the demand for better methods of joining cast-iron pipe than those now known and practised. To meet the requirements of general use, a joint must be reasonably cheap, and applicable to pipes as they come from the sand. Tool work of any kind would render them too expensive; and, like the pipe, the coupling must be of cast iron. To be accepted as a substitute for the spigot-and-socket joint, it must be either cheaper or better. To render it cheaper would be difficult, if not impossible; but the advantages of a better joint than that which can be made by means of caulked lead are so great, that economy becomes, within reasonable limits, a consideration of secondary importance.

The objections to the caulked joint for gas-mains apply in part to such joints in plumbing practice; but as the requirements in house-work are fewer and less arbitrary than in the case of gas distribution, the problem of a satisfactory joint in iron soil and waste pipes would appear to be much simpler and easier of solution. The caulked joint is the weak point of modern plumbing practice. In the examination of a building, the experienced sanitary inspector always looks first for defective joints in the main lines of iron pipe, and rarely fails to find them. Not only is it a matter of no little difficulty to make good joints by the present method, but defects due to lack of skill or to carelessness on the part of the plumber are readily concealed and very difficult of detection.

In housework, cast-iron pipes are run in places not always easy of access; and, in passing, the plumber is under the necessity of often working in very awkward positions. When this necessity confronts him, his gasket of oakum or paper, or whatever else is handy, is usually so disposed in the lead space of the joint as to ensure that the lead will meet on the side opposite to that at which he pours. If he is a mechanic of experience, he knows that unless he can pour quickly the metal will chill and set before it has filled the socket. Consequently, the gasket is so arranged as to give a comparatively deep pocket in front, wherein the lead is poured, and a shallow space behind, where the streams of molten metal, flowing around the pipe, are to meet and unite. Where it is difficult to pour, it is even more difficult to caulk. This fact accounts for much of the slighting of joints in housework. But even when every care is taken to make a good joint, the lead is very seldom of equal depth all around the joint. The writer once had occasion to remove from a large number of 8-inch and 10-inch tubes the cast couplings which had been attached to them by caulked lead joints. These joints were made in the mill, under very favourable conditions for both pouring and caulking. The work was entrusted to good

men, under competent superintendence. Since the castings were too light to be serviceable, and as scraps were as valuable broken as whole, they were broken off to save time; leaving the lead collars encircling the pipe ends. In not one case in fifty was a leading found to be even approximately equal all around. Some were 2 inches deep on one side and ½ inch deep on the other. Such inequalities are often found in housework, and the avoidance of them calls for more skill and honesty than this class of work is usually supposed to demand. Thorough caulking ensures temporary tightness if delayed until the joint has cooled to atmospheric temperature; but the least movement destroys this quality, and results in a defective and leaky joint.

The writer once witnessed an experiment with the caulked joint which was instructive. Two short pieces of pipe, one having a socket and the other a spigot end of the usual form for 6-inch water-pipe, were set up on a shop floor under conditions favouring the making of as good a joint as possible. An open gasket was packed in, and the lead so poured as to ensure the equal filling of the space provided for it. It was caulked after setting, and caulked again when quite cold. This work was done solidly and well; nothing was neglected or slighted. The joint was then tested, and with a little supplementary caulking made "as tight as a bottle," under a pressure of 400 lbs. per square inch. The work was then laid aside; care being taken that it should not be reached by the sun, or in any way disturbed. Just before the works closed down for the day, it was tested once more. With the first stroke of the pump, the water flew in every direction, and the gauge returned to zero as rapidly as the copious and increasing leakage would permit. The demonstration was conclusive. It showed that a caulked joint could not be made which would remain tight under such slight contraction and expansion of the iron as was due to the difference between an atmospheric temperature of about 84° and water at about 72° Fahr. The range of temperature to which house pipes are subjected is much wider than this; and the transitions are often quite sudden. It is not surprising, therefore, that even in good work we find defective caulked joints. That the plumber is not always, if often, to blame for such defects may be the more readily admitted, since he could not so make his joints as to warrant him in ensuring them through 24 hours of use.

What is needed for the satisfactory joining of cast-iron pipes of the kind now the standard would seem to be an elastic indestructible substance adhering strongly to iron, and flexible enough to admit of more or less disturbance without rupture or fracture. It must, of course, be tough and strong, insoluble in water, and not affected by gases. In some respects lead comes nearer to meeting these requirements than any other known substance, but it falls far short in others. That Nature has not given us, ready made, such a material as we need is probable. Whether or not it can be produced, who shall say? Failing to find it, the task of the inventor who would seize the opportunity here offered is to give us a new form of joint for cast-iron pipe in which lead will do better work than can be expected of it as a packing in the spigot-and-socket joint.

Congres International de l'Industrie du Gaz.—We are asked by M. Th. Vautier, the President of the Société Technique de l'Industrie du Gaz en France, to publish the following intimation, of general interest to all in the gas profession: La Société technique de l'Industrie du gaz en France a pris l'initiative de provoquer, à l'occasion de l'Exposition universelle de 1900, une réunion, en Congrès International, de toutes les Sociétés similaires de la sienne, et de toutes les personnes qui l'intéressent au progrès de l'Industrie du Gaz. Ce Congrès se tiendra à Paris dans les premiers jours de Septembre, 1900. C'est la première fois que les représentants de l'Industrie du gaz se réuniront en Congrès International; ce motif, ajouté à tous aux qui viennent naturellement à l'esprit des techniciens, permit de penser que cette réunion offrira un grand intérêt. Aussi les principales Sociétés gazières de l'Etranger ont-elles déjà envoyé leur adhésion, s'associant ainsi à la pensée amicale de leurs confrères Français.

The Institution of Mechanical Engineers, at their meeting on the 27th inst., will have before them a paper by Mr. W. Ingham, the Borough Engineer of Torquay, dealing chiefly with the incrustation of the water-pipes in the district. The following syllabus of the paper has been issued: "Water supply of Torquay. Quick corrosion of water-mains. Construction of scraper-knives. Force required to drive scraper. Approximate cost of scrapers, hatch-boxes, and wash-outs. Tabulated summary of scraping water-mains by water pressure in various towns. Difficulties encountered in scraping. Air-valves and decrease of corrosion. Delivery of mains before and after scraping. Diagram showing incrustation in section of 10-inch pipe in one year. Time occupied in scraping 14 miles of pipe. Analyses of rust taken from the Torquay mains compared with those of Aberdeen. Analyses of Torquay water before it enters the pipe, and when it reaches Torquay (distance 14 miles). Considerable variation of incrustation in different districts. Analyses of Otterbourne water at Southampton Water-Works. Analyses of water at Bath. Methods employed in pipe-making to lessen incrustation." Several pipe-scrapers and samples of incrusted pipes will be exhibited at the meeting.

THAWING FROZEN WATER-PIPES BY ELECTRICITY.

In the "JOURNAL" for the 21st of March (p. 721), reference was made to a successful experiment carried out at Madison (Wis.), by Professors Wood and Jackson, in thawing frozen water-pipes by means of electricity. Further particulars have since been furnished by Mr. John B. Heim, the Superintendent of the Water Department of the city, who read a paper on the subject at the last meeting of the American Water-Works Association at Columbus (Ohio). The paper has been noticed in the "Engineering Magazine," from which the following particulars have been taken.

The city of Madison, like all others along the Great Lakes, passed through a period of unprecedented cold weather last winter. The cold began late in November, after which date the thermometer never registered above the freezing-point for many weeks. It remained at about zero until late in January, when for twenty consecutive days the reading was considerably below it—sometimes as much as 26° to 28°. This prolonged cold froze the ground to a depth of 6 feet in places; and as the water-mains had a covering of only 5 feet in many districts, much alarm was experienced, particularly as to the condition of the service-pipes. The hydrants were examined and dead ends flushed, and a continuous flow of water was maintained at several extreme points where there were but few consumers. The result of this care and watchfulness, both day and night, was that only a single block of 4-inch main was frozen in the city. This was 660 feet long, and had a consumer upon it about every 33 feet, but no sewer connections. The consumers drew but a few pailfuls of water a day, and there were several unused services during the winter. The connections leading to this main froze gradually, in spite of all the flushing which could be done; and the main itself was frozen for a length of about 200 feet. When it was uncovered, it was found that at every tap the main was cracked both ways from the corporation cock; showing that the services were the cause of the trouble. About 400 services in different parts of the city were frozen during this cold weather. Fortunately some of them were so situated that the consumers supplied could go to their neighbours for water; but there were many who depended entirely upon the city water, and found the situation one of much unpleasantness. The city authorities refused to thaw out the services, as the work would have to be done at the expense of the taxpayers and other consumers who had escaped trouble by having good plumbing and keeping careful watch over their supply during the cold weather.

The plumbers used steam in clearing the pipes; requiring about a couple of days for each job. There was one service, which had a sinuous course, into which the steam tubing used in thawing the pipes could not be inserted. Mr. R. W. Wood, Instructor in Physics at the University of Wisconsin, resided in the vicinity of the house supplied by this service; and he noticed the difficulty experienced in endeavouring to free it from ice. The idea occurred to him that the heating effects of an electric current might be utilized; and he discussed the subject with Professor D. C. Jackson of the same University. They prepared a plan of procedure, and made arrangements with the local electricity supply company to meet them at this house with the necessary apparatus. Connections were made with the frozen pipe where it entered the building, and at the kerb where it had been cut by the plumber to insert his steam tubing. The trial was an immediate success; and the experiment was repeated with another frozen service 150 feet long. At this place a current of 250 ampères at 50 volts was sufficient to thaw the pipes in 12 minutes. Another trial was then made by making connections at an outside faucet used for sprinkling at one house, and inside another house across the street and 300 feet distant; and the result was equally successful. Another trial was made by connecting one of the wires with a pipe inside a house supplied through a meter, and the second wire to a hydrant on the other side of the street. In every instance the results were satisfactory.

The electricity company prepared several sets of apparatus, and commenced to thaw out services all over the city; two of them being frequently thawed at the same time. Messrs. Wood and Jackson gave the results of their study, labour, and experience freely. The University of Wisconsin instructed members of its senior class in electricity in the methods to be followed; and sent them to superintend such work whenever a call came from other places which were suffering from the effects of the unusually cold weather. Only the actual expenses incurred by these men were charged for their services; and through their advice and by mail at least fifty cities in Wisconsin and the neighbouring States were instructed in this novel and expeditious method of work. Watertown (Wis.) was the first city to call for aid; and Messrs. Jackson and Wood undertook this case personally, as it afforded the first opportunity to apply electricity to a frozen water-main. At this place 320 feet of 6-inch main was thawed out in 2½ hours, using two 25-kilowatt transformers. The wires were connected in parallel with two hydrants a block apart, and furnished a current of 100 volts. No water resistance was used, for the resistance of the main itself was sufficient to prevent overloading the transformer. A current of only 350 ampères was available, which accounts for the length of time

necessary to free the main. It is interesting to notice that the preliminary computations have been shown to be correct in every instance where the available current corresponded with the amount used in the calculation.

The Superintendent of the Electricity Company at Madison (Mr. L. E. Kerns) states as follows: "We use the alternating current, 1000 volts primary, reducing through transformers to 50 volts, and at this pressure use from 200 to 325 ampères. The services which had no flaws in them or were unbroken required an average of about 15 minutes each to thaw them out. Those which were broken or contained flaws required from 30 to 90 minutes. We thawed 101 services at a cost of $5·55 per service. The size of the wire we used was No. 2 B. & S. gauge." The Superintendent (W. M. Kimball) of the Rockford (Ill.) Water-Works says: "Electrical thawing was a great success. We thawed out 126 services. The best results we obtained were when we could get from 250 to 300 ampères. In thawing out these services, several blocks of frozen mains were also thawed. The time required to thaw a service depended upon its length, the degree to which it was frozen, the ampèrage of the current, &c., and varied from 10 minutes to 2½ hours. The cost was at the rate of $4·80 per service actually thawed, including all labour, linemen, team work, &c." The Superintendent (Mr. E. A. Croll) of the Water-Works of Iron Mountain (Mich.) says: "We have been very successful in thawing service-pipes from ½ inch to 2 inches, and found the time varied from 6 minutes to 1⅓ hours, according to the length. A ¾-inch iron service 240 feet long required 30 minutes, using 250 ampères at 52 volts. The lighting plant furnished us current at 1000 volts primary, which we transformed to 52 volts. We thawed 900 feet of 2-inch wrought-iron pipe in sections of 300 feet with 250 ampères at 52 volts; the last 300 feet including 160 feet of 6-inch cast-iron pipe, in 2½ hours."

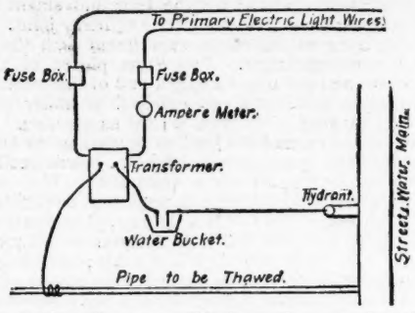
The directions which Mr. Heim gives in his paper for conducting this work are as follows: "To thaw out lead or iron services up to 1½ inches diameter, you should use from 200 to 250 ampères. If you are not able to get more than 125 ampères, it will take four times as long. If you use over 250 ampères, you are liable to get into trouble by overheating the corporation cock, stopcock, and all other brass connections. Wrought-iron pipe must be watched very closely to see that the joints do not heat. It has a lower resistance, higher conductivity, and requires more current in order to become hot; therefore you must watch the unions where the heating occurs. We have ordinarily used a transformer in the work; but in some cases we have employed dynamos directly. The source of current should have a pressure of not less than 50 volts. To thaw out 500 feet of 6-inch main in half-an-hour requires 800 ampères. If you are unable to get more than 400 ampères, it will take four times as long, or two hours; but 800 ampères will thaw out 500 feet of 12-inch main in an hour, and a 24-inch main in two hours. The source of current for water-mains should have a pressure of not less than 200 volts. In preparing to thaw out a water-main, make a connection with two hydrants by winding the wire around the hose nozzles. Screw the hydrant nozzle cap up to the wire, so as to make a close connection. Begin at the open end of the pipe, where there is no frost, with 800 ampères or less, at 200 volts, and thaw (say) 50 feet at a time. Water should be kept running for at least an hour after the main has been thawed, as it will take that length of time for the water to become slightly warmer. Three-fourths of a horse power will thaw a 6-inch main in half-an-hour per foot length; 0·2-horse power will thaw a 1-inch, and of 125-horse power a ⅝ inch service-pipe in half-an-hour per foot length. There is no danger from electrolysis, on account of the short duration of the thawing process and the ground being frozen."

The directions for thawing service-pipes up to 1½ inches in diameter, prepared by the University of Wisconsin, are given in full by Mr. Heim, who also quotes the following estimate of the financial value of this discovery from a paper published in the fire insurance interests: "A slight estimate of the value to underwriters of the invention of thawing out frozen pipes by electricity can be formed from the fact that in 1898 insurance companies paid out nearly $300,000 in losses caused by primitive method of thawing out pipes."

It appears that some service-pipes have been successfully thawed at Marquette, Bay City, and Saginaw (Mich.); at La Crosse, Reedsburg, Watertown, Sheboygan, Janesville, and Milwaukee (Wis.); and at Rockford (Ill.). At Marquette, the results have been so favourable that the Electric Light and Power Commission have established a rate of $4 in advance for thawing out a service-pipe. A 4-inch cast-iron main at Ithaca (N.Y.) was successfully thawed by electricity under the direction of Professors G. S. Moler and F. Bedell, of Cornell University. Attachment was made in the dynamo laboratory and in the chemical building, and a current of 160 ampères was maintained. A little more than 100 feet of main was thawed in 5 hrs. 40 mins. The current was carried by a No. 2 copper wire, and a pressure of 9 volts was used at the terminals of the water-pipe. The power taken was accordingly 1440 watts, or about 2 horse.

The following are the directions issued by the University of Wisconsin for thawing frozen pipes:—

The current which is required for satisfactorily thawing service pipes up to 1½ inches in diameter is from 200 to 300 ampères. The source of current should have a pressure of not less than 50 volts. Where electric light lines carrying alternating currents are available, a transformer or transformers in parallel may be used as a source of current. It is very important that direct connection of pipes to house lines should be avoided, on account of the danger of fire in which the house is placed by such connection. Where alternating currents are not available, continuous current feeder lines may be used; but these should be entirely separated from the distributing network of conductors.



The preceding diagram will show the way in which the appliances should be connected when an alternating current is used with transformer. The secondary leads from the transformer should be quite large, such as No. 3 B. & S. gauge, or even larger. In making connection to the pipes, one of the secondary leads should be taken into the house to which the frozen service-pipe goes, and contact made at that point by some form of metallic clamp, or by simply giving the conductor two or three tight twists about the pipe at any point where the pipe is exposed, or at a faucet in the house. The other secondary lead should be put in contact with the water system outside the house, and in a similar manner. This contact may be made at a hydrant or at an adjoining service-box or pipes in a neighbouring house. When there are two houses near together, each with frozen service-pipes, the two secondary leads may be connected to the pipes within these houses, and both frozen service-pipes thawed out at once.

While the thawing process is going on, the faucet should be open in the house to which the service-pipe leads. In one of the secondary leads should be inserted a water resistance, which consists, for convenience, of a bucket of water containing a bowlful of salt, and two sheet-iron or copper plates, to which the ends of the several lead are attached. This serves to control the current. In the primary leads from the electric light line to the transformer it is highly desirable to have a fuse in each lead, and an ampère-meter. When all connections are made, the plates are placed in the bucket, and then moved towards each other until the ampère-meter records a proper current. If the primary pressure is 1000 volts and the secondary pressure 50 volts, the current should ordinarily approach 15 ampères. If the primary pressure is 2000 volts and the secondary pressure 50 volts, the meter reading should ordinarily approach 7·5 ampères. Water usually begins to flow in a time not much less than 10 minutes or not greater than one hour. If the secondary current is quite close to 300 ampères, the period seldom exceeds half-an-hour. The frozen pipes are often split by the action of the frozen water, and these at once begin to leak when the ice is thawed away. For this reason it is desirable to have a plumber where he may be readily called to care for the leaky pipe.

The electric current, when properly used, will not damage the pipes. It is desirable to watch brass and iron connections to lead or iron service-pipes, as they sometimes heat on account of poor contact. If such heating appears to be excessive, the current may be reduced with a resulting increase in the duration of time for thawing. After the pipe has been thawed, it is desirable to let the water run continuously for a considerable time, inasmuch as the ground all around the pipe is frozen, and the pipe is liable to freeze again unless the water circulates.

For larger service-pipes and mains, the amount of power involved, and the difficulties to be overcome, make it desirable that special information regarding their size, material, and location should be furnished before instructions are sent out. The plan will serve excellently to thaw frozen hydrants and hydrant leads.

A Gas Actuated Fire Alarm.—Yet another use for gas! The "Electrical Review" of New York publishes particulars of a recently-invented electrical and chemical fire-alarm apparatus, which gives its indications when the atmosphere becomes so vitiated with smoke that it will not support the combustion of a gas-flame. In the interior of the apparatus a small gas-flame constantly warms a thermostatic bar; the electric circuit through the apparatus being normally open as long as the flame holds out to burn. But if the air in the apartment in which the apparatus is installed becomes vitiated with smoke, the little gas-flame goes out, and the thermostatic bar, cooling off, closes the circuit and gives the alarm.

REGISTER OF PATENTS.

Gas or Oil Stoves.—Burden, E., of Grantham. No. 12,434 June 2, 1898.

This invention has for its object to provide a burner or stove in which the air to support combustion and the gas or vapour to be consumed are initially heated so as to secure perfect combustion, and so that the resulting products discharged into the atmosphere of the room shall be innocuous; and a stove in which "effective provision shall be made for inducing circulation of air, so that thereby warm air shall be disseminated throughout the apartment in which the stove is placed."

The invention consists of a regenerative burner, of comparatively small depth or width, and of relatively large superficial area, having the burner whence the flame issues so disposed that the chamber shall be heated by the flame so as to prepare the gas or vapour for complete combustion. The burner is made of a pipe of loop form, so disposed that the plane of the flat flame of the burner is parallel or disposed in close proximity to the loop; the gas or vapour passing first through the loop, and being thus heated. The invention also consists in an arrangement of a stove in which the air for supporting combustion is conducted from an orifice or perforations in the outer casing at the upper part, downwardly to an air-chamber situated at the lower part or base of the stove; such air-chamber having a central upper plate perforated so that the air may issue through to the central space above, where the burners are provided. The air thus, in its downward flow, is heated by the radiant heat from the walls of the passage, and thereby "perfect combustion" is ensured, which obviates the dissemination of any deleterious products of incomplete combustion.

Acetylene-Generator.—Bailey, J. W., and Clapham, J., of Keighley. No. 22,826; Oct. 31, 1898.

This invention relates, firstly, to improvements in apparatus for generating acetylene in which the water for hydrating the carbide is drawn from the vessel in which the resultant acetylene is washed or cleansed of its impurities; and it consists in arranging the pipe connections so that the possibility of the acetylene, in passing through, forcing its way or escaping by the pipe through which the water is supplied to the vessel, is avoided.

As shown by fig. 1, the vessel A, through which the acetylene passes in order to be purified, is made in two parts by a partition B extending

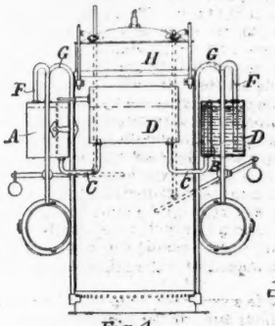


Fig 1.

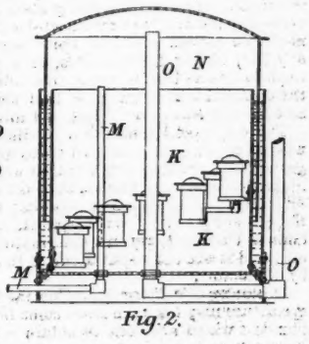


Fig 2.

from towards the top down to within a short distance from the bottom. Into the smaller half the water-supply pipe C is carried (fed from the tank D), having its upper end arranged nearly level with the water when in working condition, while the pipe F conducting the gas from the generator is taken through the top of the larger part, and extends downwards so that its end is slightly above the bottom edge of the partition. The pipe G conducts gas to the holder H. By this arrangement, the acetylene is led from the generator through the water in the vessel A, and, rising to the top, passes to the holder without incurring the possibility to escape through the feed-water pipe C.

The second part of the invention relates to the chambers in which the carbide is placed; and it consists in arranging the parts so that given portions of carbide may be hydrated in succession, instead of the whole of it being acted upon immediately any water is admitted. To effect this, the generating chamber K (fig. 2) is arranged to receive a number of boxes mounted at different heights (or constructed of different depths, if desired), and provided with hollow lids or coverings, so as to float when placed in water. By this means, on water being admitted to the chamber K by the water-supply pipe M, it first enters the box 1 at the lowest level; then rises to enter the next highest holder 2, by raising its lid and passing beneath same; and so it goes on, until the last or highest of the cylinders has been filled. The gas generated is carried away from the holder N by means of the pipe O.

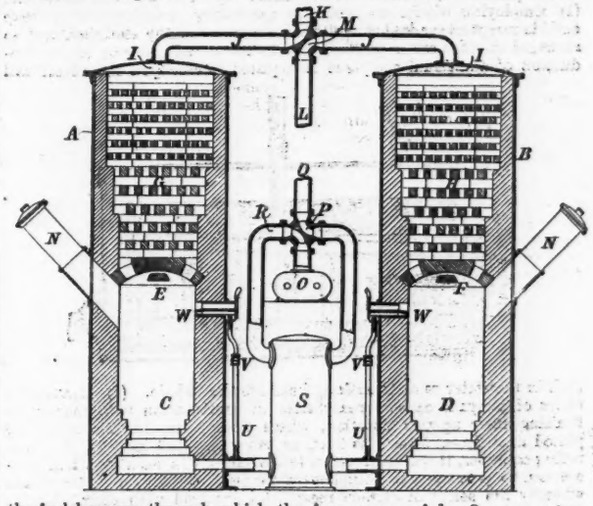
Preventing the Surreptitious Opening of Padlocks.—Glover, R. T. & J. G., of St. John Street, Clerkenwell. No. 23,908; Nov. 12, 1898.

This invention has for its object, the arranging of "appliances under or behind the keyhole plate, or under or behind a false plate in front, or under or behind a strap across the keyhole portion of a lock front plate to enable an appliance termed a 'seal' to be inserted to cover the keyhole proper when pushed in or dropped down a slot, and to become located by such push or drop motion as to be securely connected by spring claws, and the main portion to be removable only after an exposed portion has been severed." The invention is applicable for general purposes where locks are used, but is specially intended for padlocks affixed to coin-freed or coin-in-the-slot gas-meters. No special tool is necessary for severing the strap; a knife or cutter of any kind being alone sufficient. Again, no compression of the seal is required after being pushed or dropped into the pocket in which it is located.

Producing Lighting, Heating, and Power Gas.—Elworthy, H. S., of St. Heliers, Jersey, and Lane, H., of Birmingham. No. 25,771; Dec. 6, 1898.

Hitherto (the patentees say) gas-producers have consisted of two kinds. In one type, the gas is made by passing a mixture of steam and air through incandescent fuel; the result being a gas largely diluted with nitrogen, and possessing but low calorific value. The other type of producer is intermittent; generating alternately an impure gas of low calorific value (which in many cases is valueless) and water gas. Their present improvement relates to the intermittent variety of apparatus, and "consists of such a combination and arrangement of parts, that the poor gas generated during the one operation is utilized for the production of the richer and more powerful gas made during the other alternating period."

The gas-producers A B each consists of an outer casing of the usual construction, lined with refractory materials, and having inside a fuel-chamber C D, a combustion chamber E F, and a regenerating chamber G H. The top of each regenerative chamber is preferably covered by a perforated plate I. Outlet-pipes J lead either to the chimney-pipe K or to the steam inlet-pipe L, according as the four-way valve M is set. N are



the fuel hoppers, through which the furnaces are fed. O represents a blowing engine, also supplied through a four-way valve P. Q is the gas-outlet; while R, in the position shown, is the tube delivering from O into the surface regenerator S, provided with tubes or other divisions for the interchange of heat from the gas to the air. T are the lower connecting tubes between the regenerator S and the producers. Each tube T has a narrow branch-pipe U, intended to admit air above the fuel through the tuyere W, and provided with a valve V.

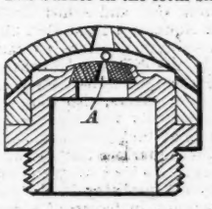
The action of the apparatus is as follows: Both furnaces having been initially lighted up, and the fuel having become incandescent by natural draught, the clinker doors are closed and the blower O set in action. Air thus passes up through the surface A. The fuel is heated up, and undergoes partial combustion, which is complete when the products reach the supplementary air supply which passes directly into the combustion space E through U V and W. The hot products of combustion then go up through the chequer-work C of the regenerator, leaving the heat behind them progressively. Then, comparatively cool, they pass away through the valve M to the chimney. At the same time, steam flows through the pipe L and valve M, going down through the hot chequer-work of the producer B. The highly superheated steam then passes down through the incandescent fuel in D, and carries with it any volatile gases; and it is subsequently decomposed by interaction with the incandescent carbon. This operation results in a mixture of coal gas (if coal is used), carbonic oxide, and hydrogen—"a mixture of great value for lighting, or power, or heating purposes"—which passes into S, and there yields a great part of its heat to the air driven in from O. Finally, the cooled gases pass away for use.

As soon as the heat of the furnace is so far reduced that the steam is insufficiently decomposed, the valves are reversed, and the operation is repeated in the opposite direction; and so on. The fuel is fed into the lateral hoppers N preferably when air is passing upwards in each case.

Acetylene-Burner.—Geisseler, G., of Neuveville, Switzerland. No. 7200; April 5, 1899.

This burner is intended to "effectually withstand" the heat of the acetylene flame, and not to become clogged or rapidly worn out with the passage of gas and the heat of the flame.

The burner in the form shown is made of very hard material—preferably of precious stone—bored through at A, and set in a metal stopper screw-threaded for attachment into the end of a gas-pipe. On a rim of the stopper is placed a cap of metal or other suitable material, provided with a hole corresponding to the orifice A, but a little larger. A certain space is left between the bottom of the cap and the upper part of the burner; and the cap may be provided with a number of openings so as to allow the outside air to get into the space and be drawn with the gas going out at A. The flame produced is therefore at the outside part of the top hole, and it is the part of the cap where the hole is which is usually burnt by the heat of the flame, so that it will be sufficient to replace the cap now and then. "The use of precious stone—such as, for example, sapphire, ruby, garnet, &c.—for the fabrication of the burner, makes it last very long; and a needle or a wire may be run through the hole to clean it without running the risk of enlarging or spoiling it."

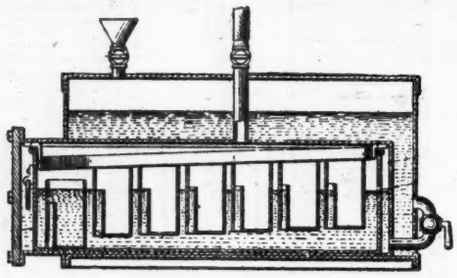


Gas-Engines.—Mahon, A., of Washington, U.S.A. No. 10,807; May 16, 1899.

This invention relating to gas-engines has for its object: First, to cause the exploded and non-exploded gases to flow from the cylinder through different channels or passage-ways, thereby preventing their mixing after leaving the cylinder; and, secondly, to provide for the non-exploded mixture or gases emitted from the cylinder in such manner as to prevent danger therefrom. It consists in the combination in an explosive engine of a cylinder and piston and mechanism adapted to be actuated by the explosive force independent of the piston and its actuated mechanism, so as to control the operative action of the engine; and it further consists in the combination of a cylinder, a piston, an outlet for exploded gases (which is adapted to be opened in the normal working of the engine, and kept closed when a charge fails to explode), and means for removing the unexploded charges from the cylinder.

Generating Acetylene.—Imray, O.; a communication from F. C. Wilson, of Chicago, U.S.A. No. 13,805; July 4, 1899.

The patentee claims for the apparatus shown in sectional elevation: (1) Employing within an acetylene generating chamber one or more carbide receptacles adapted to float in the water of the chamber, and so arranged that the water gains access to the carbide therein as the production of additional acetylene is required, whereupon the vessel will



sink in the water so as to entirely immerse the carbide. (2) Arranging a series of buoyant carbide receptacles in combination with means for limiting their upward flotation, where their inlets for the water are placed at different levels; so that, as the water-level rises in the generating chamber, it will gain access to the carbide in each vessel in succession, so as to effect its complete immersion. (3) Arranging the means whereby the series of carbide receptacles are held with their inlets at different levels, so that, according as the production of additional acetylene is required, the receptacles are successively lowered, in order that the water may gain access to the carbide therein, and cause the vessel to sink. (4) Arranging the carbide receptacles within a pan or drawer contained in a removable manner within the generating chamber, and communicating therewith, so as to be partly filled with water therefrom, in which water the carbide receptacles float.

APPLICATIONS FOR LETTERS PATENT.

19,823.—Colbran, J. B., "Gas-fittings." Oct. 3.
19,826.—Grocott, F. C., "Gas grilling apparatus." Oct. 3.
19,900.—The Buffington Acetylene Gaslight Company, Ltd, and Braun, H. C, "Generating acetylene gas." Oct. 4.
20,001.—Duff, E. J., and The United Alkali Company, Ltd., "Wash towers for treating producer gases." Oct 5.
20,029.—Duncan, J. H. H., The New Sunlight Incandescent Company, Ltd., and Barnett, H. T., "Incandescence mantles." Oct. 5.
20,042.—Broughton, R., "Gas-burners." Oct. 6.
20,048.—Rogers, H. J, "Manufacture of acetylene gas." Oct 6.
20,079.—Gilbert, W. S., "Incandescent gas lighting." Oct. 6.
20,098.—Höffding, T. N., "Generating acetylene gas." Oct. 6.
20,124.—Haddan, R., "Electrically controlling gas-cocks and lighting gas-burners." (A communication from La Société Anonyme "Lux Nora.") Oct. 6.
20,152.—Sharp, H., "Gas-fittings." Oct. 7.
20,167.—Mills, C. K., "Acetylene gas-generators." (A communication from G. Mallet.) Oct. 7.
20,175.—Adams, B. R., "System of illuminating with special forms of incandescent illuminators, for gas." Oct. 7.

Incandescent Gas Lighting for South London.—As anticipated in a recent issue of the "Journal," the St. Saviour's (Southwark) Board of Works have unanimously adopted the scheme set forth on p. 831 for the incandescent gas lighting of their district.

The Projected Gas Exhibition at the Aquarium.—From information to hand, it appears that the forthcoming Gas and Allied Trades Exhibition to be held at the Westminster Aquarium from Dec. 21 to Jan. 23 next (as already intimated in our columns), is making satisfactory progress. Some well-known firms in the different branches of the gas trade have already entered into contracts for space—including gas-plant, gas-meter, gas-stove, and gas-engine makers, also those engaged in gas lighting. The latter are exceptionally well represented; and the Aquarium promises to be a blaze of light during the exhibition. It may interest our readers to learn that the Aquarium Society, while negotiating with some of the firms exhibiting, have been so struck with the latest systems of gas lighting that they will probably in the near future discard the electric light, with its vagaries, in favour of a complete gas installation. A better testimonial to the recent great advances in gas lighting could hardly be obtained, as the Aquarium has practically a special plant for the supply of its electric light. Referring again to the exhibition, the organizers are at present negotiating with some leading specialists; and it is proposed to give interesting lectures dealing with the use of gas for power purposes, cookery, &c.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Prices of Raw Material and Manufactured Products.

Sir,—I must disclaim the suggestion in your editorial of the 10th inst., that I desired in my remarks at the general meeting of the Commercial Gas Company to be either "personal" or "*rankling*," or to be deliberately disposed to cause pain. I have neither the time nor the temper for such tendencies.

But, if occasion required, I could give illustrations, over the whole range of gas companies' dealings, of an apparent determination to combine for the purpose of forcing-up prices of every kind, on the pretext of the advance in raw material.

It "rankles" *me* to find an advance of 30s. per ton in pig iron made the excuse for advancing manufactured products which involve comparatively insignificant weights by repeated steps of large percentages.

I am bound to say that I find a wide-spread impression among traders that gas companies are fair prey, and should be made to pay more than private traders on a smaller scale.

There are signs, moreover, that seem to indicate to me that arrangements are often made to prevent free competition in tendering. These are courses I shall ever try to defeat without fear or favour.

Stepney, Oct. 14, 1899. Hy. E. Jones.

Hastings Carburation Process.

Sir,—It is to be regretted that Mr. Botley has not earlier taken advantage of the many opportunities and invitations to discuss the theory of his process, and that he did not accompany his statement regarding the deposits of naphthalene in the purifiers and inlet to the holder, in the presence of the carburetted water gas, with the why and the wherefore of these deposits. His declining to do so now for lack of time is rather a lame excuse.

Of course, as Mr. Botley remarks, it is evidently useless prolonging the discussion under such circumstances, as on those very points hangs the whole value of the discussion. I have endeavoured to give what appears to be a logical explanation of the method in which the process acts in preventing naphthalene being deposited in a solid form, as also the reason why carburetted water gas, when *properly* manufactured, acts in preventing naphthalene being deposited, and how it would contribute to the success of the carburation process at Hastings. Mr. Botley's remarks regarding the effects of carburetted water gas when produced under what might be termed abnormal conditions—that is, a semi-permanent (or oily gas) at low temperatures, or a comparatively dry gas containing naphthalene at high temperatures—are entirely his own. A reference to the correspondence will show that they were advanced by Mr. Botley to suit his own line of argument, not mine, as he now tries to make out.

The only part I have taken in discussing these abnormal conditions was to explain that it was not neces ary to undercrack the oils to get the gas containing suspended oil; that when the oil was cracked to give the highest illuminating results, the gas contained sufficient oil to reduce the difficulty from naphthalene deposits; and that, on the other hand, when the gas was produced at the opposite extreme (which is apparently being done at Hastings), the full illuminating value was not obtained from the oils, and it allowed naphthalene to be deposited in the manner described by Mr. Botley.

In closing this discussion, allow me to express the hope that the correspondence may have produced some facts towards the clearing up of the haziness which appeared to obtain regarding the method in which the Hastings carburation process acted in preventing naphthalene being deposited, and of the principles involved in the solution of the naphthalene problem generally.

Priorsford, Peebles, Oct. 13, 1899. Wm. Young.

An Interesting Corporation Seal.—Smethwick has lately been raised to the dignity of a borough; and there is great excitement over the election of the first Town Council. The seal of the new body will be an interesting one to the gas industry, which is to be represented in its design. The motto is to be "The Workshop of the World;" and the design is a lighthouse symbolical of the manufacture of glass, a gasholder symbolical of the fact that gas was first used in Smethwick by Murdoch, an old beam-engine from one made by James Watt at Smethwick, and Vulcan working at the anvil, illustrative of the iron and steel industries of Smethwick.

The Position of Consumers under Municipalities.—At this season of the year, it is customary for municipal councillors to give their constituents an account of their stewardship, or in some other way express their views upon the current topics of their town. An opportunity of this kind presented itself to Mr. J. Henry, one of the members of the Leeds Corporation, who addressed a meeting of the Leeds and County Liberal Club on the 7th inst. on "The Municipal Work of the Year." Dealing with finance, he expressed the hope that the members were satisfied with the work of the Finance Committee of the Corporation. They professed to be making ends meet, but were doing so by getting rid of assets. They had taken what was an asset in the shape of accumulated profit, and used it to "make ends meet." They had no right, for example, to charge the consumer of gas with the money which ought to be paid by the consumer of electric light; they had no right to relieve the rates of the latter at the expense of the former. Users of electric light ought to be charged a price that would enable the undertaking to pay its way. Gas-works and other public undertakings were not handed over to corporations in order to be carried on as profit-making concerns, but in order to wrest them from monopolists who would charge extravagant prices. If they had sufficient profit to meet capital charges and make reasonable provision, this was all they were expected to do. The consumer should then get the benefit; and he hoped the gas consumer would make his voice heard in this matter. These remarks were greeted with applause.

LEGAL INTELLIGENCE.

EXMOUTH PETTY SESSIONS.—Monday, Oct. 9.

(*Before Mr.* R. Ley *and other Magistrates.*)

The Laying of Pipes, and the Breaking up of Roads.

Several cases were heard to-day in which the Exmouth Gas and Water Companies were summoned, at the instance of the Urban District Council, for breaking up the roads without sufficient notice.

Mr. E. J. Vine appeared for the District Council; and Mr. H. Harris represented the Companies.

The cases against the Water Company were first heard.

Mr. Vine quoted the section of the Water-Works Clauses Act under which the proceedings were taken, and said that letters had passed between the Council and the Company requesting that proper notice should be given when the roads were to be broken up. In the first case—that of breaking up the road on the Parade—notice was given only on the morning the work was commenced, instead of three clear days before.

Mr. *W. Harding*, Surveyor to the Council, said that of late there had been considerable breaking up of the roads in different parts of the district; and on complaint of this being made, he wrote to Mr. Beavis, the Manager of the water-works. On Aug. 16, he received notice from the Company of their intention to break up the Parade; and on going there with Mr. Beavis, he found that the work had commenced. He complained of this to Mr. Beavis, who replied that the work was urgent.

In cross-examination, witness said the path was not broken up, but only rather more than 2 feet of the roadway. A pipe was being connected for flushing purposes. He did not consider this a case of emergency under the Act, though, speaking generally, he should say that where there was an absence of water for this purpose it should be attended to at once. There had been negotiations between the Council and the Company as to the repair of roads broken up; but no terms had been come to.

Mr. Harris, for the defence, said the question whether this was a case of emergency was entirely one for the Bench. The owner of seven houses on the Parade received notice from the District Council, as the Sanitary Authority, to put in flushing apparatus. This he did; and finding there was no supply of water, he spoke to Mr. Beavis, who examined the internal fittings and then had a small portion of the roadway opened up to discover the defect. It was ridiculous to suggest that three days' notice should have been given prior to the 16th of August of a defect which was not discovered until that date, or that these houses should be without water for flushing purposes three days in the hottest month of the year while notice was running.

Mr. *G. Beavis*, the Manager of the water-works, and Mr. *Setten*, the owner of the houses, gave evidence; the former stating that he sent notice to the Surveyor immediately he discovered it would be necessary to open the road.

The Magistrates came to the conclusion that it was a case of emergency, and dismissed the summons with costs.

In a second case the road was opened to replace a corroded service-pipe connected with a hotel; and this summons was also dismissed on the same ground.

Four summonses were then heard against the Gas Company. The first was for breaking up Victoria Road and not re-instating it and making it good.

Mr. Vine said the Surveyor had frequently called the attention of the Gas Company to their neglect to restore the roads they had broken up. The Council did not take these proceedings in a vindictive spirit; but they desired the Company to know that the requirements of the Act must be complied with.

Mr. *Harding* stated that the road was made by the steam-roller in June, and shortly afterwards was broken up by the Company. It was not properly re-instated. There was now a ridge in the road where it was broken up. The metalling used was not of the same quality as the rest of the roadway.

Mr. Harris said it was a very regrettable case, and there had evidently been no desire to spare the Company, but rather to make it as unpleasant as possible for them.

Mr. *C. Ware*, formerly Surveyor of Exeter, said he inspected the road on the 6th inst., and found a ridge where the road had been broken up. Considering the exceptionally dry weather, he thought everything possible had been done to re-instate the road.

Mr. *J. T. Foster*, Secretary to the Gas Company, said that after the road was opened the horse-roller was used to level it; and it was again rolled in September.

The Magistrates dismissed the case with costs.

The remainder of the summonses were for breaking up the roads without giving three days' notice. In the first of these cases, notice was given on the 22nd of August, and the work was commenced on the 24th.

Mr. Harris admitted that a technical offence was committed. There was some friction between the Council and the Company; and it might be right for the Council to insist on the full notice being given. But seeing that nothing was ever done by the Surveyor to inspect the works when notice was given, he submitted that it was a farce for the Council to come to the Court and ask for a penalty.

The Magistrates held that there had been a breach of the Act, and fined the Company £1 and costs.

A similar penalty was imposed in two other cases, in which it was admitted that the statutory notice had not been given.

Main-Laying not an Operation under the Workmen's Compensation Act.

Last Thursday, at the Marylebone County Court, Judge Stonor, in giving judgment in the case of *Bennett v. Aird and Sons*, said the applicant in this case was employed by the respondents striking an iron wedge to open a road, underneath which water-pipes were being laid by them. Another workman, striking the wedge alternately with the applicant, knocked it on one side. Thereupon the applicant's hammer missed the wedge, swung right round, and dislocated his shoulder, which he had since been unable to use. The Manager, who appeared as representative of the respondents, submitted that the case did not come within the Act. The learned Judge, after considering the construction of section 7 of the Act and the significance of the words "mechanical power," said that, on the whole, he thought that the words "mechanical power" must in the present case be construed as *ejusdem generis* with those mechanical powers previously mentioned—viz., "steam and water," which act automatically and continuously after having been set in motion in the first instance by manual labour. He therefore was of opinion that the present case did not fall within the Act, and gave his award in favour of the respondents, but without costs. Alluding to the above case, a correspondent writes: "This decision, it will be seen, excludes from the operation of the Act all men engaged in laying or repairing mains or service-pipes. As it is obvious that inspectors, lamplighters, syphon-pumpers, and stove-fitters do not come within the definitions of the Act, it may be said that gas companies incur no liabilities under the Act in respect of the men employed in the distribution department. This has probably been taken into account by managers when insuring. It is, however, well to be reminded of the fact by a judicial ruling."

Interfering with Meter Connections.

Before the Tunbridge Wells Borough Magistrates yesterday week, a man named Pree was summoned for injuring a gas pipe, meter, and fittings belonging to the Gas Company, through culpable negligence or in other ways. Defendant said he had a wife lying dangerously ill, and he was told that he must not burn gas owing to her illness. He disconnected the meter and outlets, but with no intention to defraud the Company. Defendant was fined 10s. and 12s. costs; this being the first offence.

Imprisonment for Robbing a Slot Gas-Meter.

Yesterday week, at the Ystrad Petty Sessional Court, a man named Joseph was charged with stealing 7s. 4d., the property of the Pontypridd District Council, some time between June and August last. The evidence showed that in June the Council placed a penny-in-the-slot gas-meter in defendant's house; and when it was examined in August the meter showed that 1900 cubic feet of gas had been consumed. There should have been a sum of 7s. 6d. in the box; but only 2d. was found. When questioned by the gas inspector, prisoner said he had borrowed a key from a neighbour and had taken the money, but intended refunding it. Prisoner had since left the district. When charged he pleaded "guilty," and was sent to prison for fourteen days without the option of a fine.

A Light Fine for a Serious Offence.

Yesterday week at the Sandwich Petty Sessions, a man named George Sutton was summoned for disconnecting a gas-meter without giving 24 hours' notice in writing to the Corporation. Mr. J. Donaldson, the Gas Manager, said that when he went to examine the slot meter and take the money, he found the meter disconnected, and the service and house pipes connected up with a piece of india-rubber tubing, so that the gas consumed did not pass through the meter. The amount in the meter was 6s. 8d. in July and 5s. 7d. in August; but last month it was only 1s. 11d. The defence was that a portion of the ceiling fell, and broke the meter down the night before; and to get light Sutton connected up the pipes. Mr. Donaldson said there was not sufficient fall of the ceiling to injure the meter; or if it had fallen, the pipes would have kept it up. Besides, defendant could just as easily have connected the tube to the outlet from the meter as to the service-pipe. For the defendant, it was contended that there was no intent to defraud the Corporation; but the Bench imposed a fine of 10s., including costs.

Embezzlement by a Gas Company's Collector.

Last Wednesday, at Rochdale Police Court, John Broxup was charged with embezzling money belonging to the Whitworth Vale Gas Company. The prisoner had been sixteen years in the employ of the Company as a clerk and collector; and the total amount of his defalcations was about £58. Broxup had concealed his defalcations by falsifying his books; and after evidence in support of the charge had been given by Mr. E. Lord, the Manager and Secretary, the Magistrate sentenced the prisoner to three months' imprisonment.

Under the heading "Damages for Wrongful Dismissal," a paragraph appeared last week giving a report of an action heard the previous Friday in the Sheerness County Court. We are asked to mention that the proceedings were instituted against the Sheppy Glue and Chemical Works, at Queenborough, not against the Sheppy Gas Company, as wrongly stated by our local correspondent.

Projected Gas-Works Extensions at Burslem.—Yesterday week, at the meeting of the Burslem Town Council, it was decided to make application to the Local Government Board for a Provisional Order amending the Burslem Local Board Gas Act, 1877, so as to empower the Corporation to borrow further sums of money not exceeding £50,000, in addition to the amount which they are authorized to borrow under the Act, and also allowing them the use of certain additional land for gas purposes.

The Resignation of Mr. Tindall.—The retirement of Mr. J. Tindall from the active management of the Walsall Corporation gas undertaking, and his retention in the service of the Corporation as Consulting Engineer, was announced in last week's issue. It is interesting to learn that Mr. Tindall has been in the service of the Corporation thirty years. During his management of the gas-works, the annual production of gas has increased from 88 million cubic feet to above 400 millions; while the total net profit earned has been £142,636, although about £150,000 has been spent in the extension of the works. There has been no fatal or even serious accident to any of the workmen employed under his supervision. This is certainly an excellent record.

MISCELLANEOUS NEWS.

THE SOUTH METROPOLITAN GAS COMPANY'S PROFIT-SHARING SCHEME.

The Co-Partnership Conference of the Labour Association.

This conference was held on Saturday at Newcastle-upon-Tyne, under the presidency of Mr. H. Crawford Smith; and to it Mr. GEORGE LIVESEY was invited to contribute a paper giving particulars of the profit-sharing scheme of the South Metropolitan Gas Company. The history of the movement—its initiation and progress during the years since the scheme was started in 1889—has been so fully detailed from time to time in the "JOURNAL" that it is not necessary to reproduce the earlier portions of Mr. Livesey's paper; but passing over his "simple historical statement of facts," we give his record of the general results of the system.

In this connection, the author said: It is extremely difficult for any man who has taken a deep interest in the development of an idea, or in carrying on any work, to be absolutely without bias in speaking of results. If, however, they are not to the advantage both of employer and employed, the end must be failure. I have been in the Company's service in various capacities since 1848—Assistant to my father, then as Engineer, next Engineer and Secretary, then Director, and for fourteen years Chairman. I remember well the old friendly relations when every man was known personally, and the kindly feeling that then existed; but never have the relations of employer and employed been on such a footing of mutual confidence and goodwill as during the last ten years. Each feels quite free to speak to the other with the respect due from man to man on any subject; and reason rules on both sides. Of course, this is a general statement; for among the large number of men employed, there are exceptions to the rule. But their fellows do not put them forward; and they have no perceptible influence. Such friendly relations as have existed since 1889 (when profit-sharing was introduced and the strike took place), induce cheerful willing work, which has considerable, although unascertainable, money value.

Information of a definite character, however, is available by comparing the three London Gas Companies. The rates of wages paid to their stokers are the same in all three Companies; but the cost of wages per ton of coal carbonized is strikingly different. In the case of the South Metropolitan Company, last year it was 2s. 3d. per ton—about 1s. per ton lower than the other two Companies, and saving about £50,000 a year. This difference of 1s. per ton is due partly to the South Metropolitan Company having a larger proportion of stoking machinery than the other Companies, and partly to the better working of the men. This better working tells in two ways. There is a willingness to work machinery to its full power, which is an inducement to the Company to apply it extensively, whereas with the other Companies it is not so; for, from the evidence given before the Parliamentary Inquiry into the working of the London Gas Companies last session, it appeared that stoking machinery is not of much advantage to them, because the work it can do is restricted. The other way in which the better working of the South Metropolitan stokers is manifested is in the hand work—they are willing to work the retorts to their proper capacity, not counting the shovelfuls of coal put into the retorts. Thus the difference in the cost of carbonizing is accounted for. The greater part is no doubt due to machinery; but there is quite enough remaining to balance the amount paid to the stokers as profit-sharing. It may also be said of the Company's workmen generally that the profit-sharing bonus is earned by a large proportion of the men. Some respond heartily to the principle; while others are not influenced by it. To discriminate is therefore most necessary—on which something must be said later.

Another test is the price charged for gas by the three Companies. In 1889 it was 2s. 3d., 2s. 4d., and 2s. 6d. per 1000 feet respectively. It is now 2s. 1d., 2s. 6d., and 3s.; the South Metropolitan being the lowest both then and now—having improved actually and relatively. The improvement is by no means entirely due to profit-sharing; but it is so in part. Moreover, the Company's stock stands at a higher relative value in the market than that of any other Gas Company.

A further advantage to the Company consists in the thoughtful interest the best of the men take in its welfare—shown by suggestions for improvements in apparatus and working.

The advantages the men derive from the system are educative—a general elevation and strengthening of character in those who respond to the principle, besides the material improvement in their position, of which the accumulation of over £125,000 is a sure indication. It is also an advantage to them, as well as to their employers, that they do their work in a happy, contented frame of mind, rather than in an indifferent spirit.

Profit-sharing does not depress wages, at least in gas-works. Last year the law of supply and demand indicated that an increase of stokers' wages was advisable. The two profit-sharing Companies took the lead, both of the other Gas Companies and the Trade Union, with an advance of 7½ per cent.; making the wages 6s. for an eight-hour shift. This rate, even in this busy time, commands an ample supply of men. The other Companies followed rather unwillingly; the Engineer of one of them saying: "If our men would work as well as yours, I would gladly give the advance, and profit-sharing into the bargain."

Notwithstanding the soundness of the principle, and all that has been said and done in favour of profit-sharing, it makes little headway. One firm after another adopts it; finds it successful for a time; the glamour passes away; and it is quietly dropped. The reasons given are in different words, but may too often be summed up in "want of interest on the part of the men," "workmen do not respond," &c. The chief reasons for failure are the indiscriminate giving of the profit-sharing bonus to the indifferent as well as to the good workman, and the payment of the bonus in cash, which rarely does any permanent good, and often does real harm to the recipient, making him even less careful and thrifty than he was before. Profit-sharing in its simple form, in fact, does not go far enough to be a permanent good either to employer or employed, and cannot therefore be expected to take hold. If, however, it is used as a means, and it is the only practicable means, for securing co-partnership—the term adopted by the Labour Association—or share-holding, as in the Gas Company's case, with the responsibilities attaching thereto, it has the power to revolutionize industry in the best way possible.

We seem to be at the parting of the ways, if they have not parted already. The days of small industries and the old relationships of master and men are gone past recall, and joint-stock enterprise on a large scale (with capital and labour holding diverse views, to put it mildly) is now the rule. The desideratum is to combine the two interests by making the employees partners; and here the co-partnership principle of the Labour Association comes in. The only practicable means whereby workmen can find the money is through profit-sharing paid mainly in shares, not in cash; for it is so difficult to save money for the purpose by weekly driblets.

A prolific cause of failure of profit-sharing arrangements is that they are left to work themselves; and, so left, they usually work themselves out of existence. As an illustration (though fortunately not fatal) the case of the Crystal Palace District Gas Company may be given. Here in 1894 a scheme on the same lines as the South Metropolitan Company's was adopted; but after two or three years no appreciable improvement in working was perceptible. There had been a good start; the men heartily and unanimously accepting the scheme with a 3 per cent. bonus—it is best to begin low, and 3 per cent. does well for a beginning. It went up in successive years to 4 and 5 per cent., but most certainly it was not earned by the great bulk of the men, though they seemed to appreciate it at first. The chief reasons for this failure were the want of active interest on the part of the management, and the indiscriminate giving of the bonus to good, bad, and indifferent workmen. It was consequently, after a year or two, taken as a matter of course, and had very little effect. Every man was allowed to sign an agreement, without any attempt at discrimination; whereas agreements should have been withheld from careless or indifferent workmen. Such, on the expiry of their agreements, should be told that they cannot be renewed until they show more interest in their work; that they may make another application in three or six months, and then if they have done better, they may be allowed to sign for three or six months instead of the usual twelve months—the winter men who are profit-sharers sign, of course, for shorter periods. Discrimination in the matter of agreements should be the special work of the employer or his manager or the head of a department, not of any subordinate officer or foreman. Justice tempered with Mercy being his guide, good men will then be encouraged, and the indifferent stimulated to do better. The surest way to make the good workman indifferent is to treat all alike; for why should he show interest and zeal when the indifferent workman, who does not earn the bonus, receives it equally with himself.

It has been said that profit-sharing means driving the men. This is untrue; its object is simply to induce men to give a fair day's work for a fair day's pay, willingly and cheerfully.

These agreements have been objected to, but never by the men, who greatly value them, because they assure twelve months' constant work. But they are not indispensable to profit-sharing. The late Mr. Mundella once said to me: "I like your profit-sharing system; but I do not like your agreements. Are they necessary?" I called the eighteen workmen's representatives of the Profit-Sharing Committee together, and put the matter to them. They were absolutely and earnestly unanimous in urging that the agreements should not be abolished; stating that any alteration would "greatly upset the men." I reported this to Mr. Mundella, who replied that he was quite satisfied.

The change in working the system made two years ago at the Crystal Palace District Gas-Works has resulted in a material reduction in the cost of carbonizing; and incipient failure has changed to success. Success, in fact, depends in this as in all that is good, on earnest, intelligent, and patient working by the chief, coupled with the hearty assistance of officers and foremen, and the co-operation of the rank and file. To ensure this, officers and workmen should be in the same boat—all being equally interested as profit-sharers on the same basis.

I have attempted to describe a humble endeavour to unite Capital and Labour, which I trust may be their happy destiny eventually and generally. It is proverbially dangerous for others to try to force or to hasten a union; but the parties themselves, taking example and encouragement by seeing what has already been done, for instance, by such a man as George Thompson, cloth manufacturer, of Huddersfield—the pioneer in this country, as Leclaire was in France, in converting a private firm into a co-partnership business, and with the Workmen Directors—may perhaps be led to think they have already lost too much time. Capital fears that advances will be rejected, and Labour is suspicious. They will certainly never be happy apart. Labour is coy and shy, and will not be easy to win; but she is well worth all the cost and trouble of winning, and when won both will have a full reward. The Golden Rule after all is the best guide: "Whatsoever ye would that men should do to you, do ye even so to them."

Sir Benjamin C. Browne, Mr. G. B. Hunter, Mr. Hugh Boyle, Mr. J. Wilson, M.P., the Bishop of Newcastle, Messrs. Austin and Butcher (the Workmen-Directors of the South Metropolitan Gas Company), and others took part in the discussion on the paper.

SUNDAY LABOUR IN GAS AND OTHER WORKS.

A Paper by Mr. Livesey at the Church Congress.

Among the subjects under discussion last week at the Church Congress was a paper—read at Wednesday afternoon's meeting—by Mr. GEORGE LIVESEY, entitled "Certain Needful and Needless Sunday Employments;" and, as may be surmised, the author used his opportunity to urge what had already been done, and might still be accomplished, to reduce Sunday labour to a minimum in (among other places) gas-works. Portions of the paper, therefore, are of special interest to our readers.

Mr. Livesey commenced by quoting from a letter he had recently received from Mr. W. H. Maw, one of the Editors of "Engineering," who had been asked to furnish a list of industries in which Sunday work is needful. Mr. Maw wrote that he was inclined to divide what he called "justifiable Sunday labour" into three classes: 1. Labour connected with the maintenance of the health of human beings and animals, and

which may really be called *necessary* labour. 2. Labour which has become necessary in consequence of the conditions of civilized life, and which could not be dispensed with without serious loss to the community. 3. Labour which our conditions of life render justifiable, although it cannot be considered an absolute necessity.

Mr. Maw continued: "In the first category I should place all labour required in connection with the food supply of human beings and animals. In the old days, this would have consisted chiefly of what would be called domestic service; but under present conditions of life this is materially altered. The milk supply of large towns; the feeding of horses employed by our omnibus, tramway, and railway companies, and carriers, &c.; the service of hospitals; the attendance of chemists at their shops to make up medicines; the work of sailors on active service, and I think I may add the police service, are all matters involving a vast amount of *necessary* Sunday labour which could not be stopped without risk to life.

"In the second class of Sunday labour, the varieties to be included are exceedingly numerous; and the following list is probably a very incomplete one, but may serve to illustrate what I mean. In this class I should include: Labour connected with gas, water, and electric light supply; lighthouse and harbour service; coastguard and some military service; postal and telegraph service; railway service, so far as necessitated by the keeping open main lines of communications, the carriage of mails, &c., and the execution of repairs and renewals which cannot be carried out on week-days. The working of blast furnaces. (The labour necessitated by the continuous working of these furnaces can be much reduced on Sundays, but cannot be entirely done away with.) Labour at chemical works, necessitated by the carrying out of processes of a continuous character. Labour connected with some of the furnaces at glass-works. Labour connected with coke-ovens. (This, like blast-furnace work, can be materially reduced on Sundays.) The execution of repairs at mills, works, and factories, which could not be carried out at other times without stoppage and consequent loss to employees. A limited amount of labour in breweries and distilleries"—to this, as a teetotaller, I demur—"also in iron and steel works (apart from repairs), dye works, mines (particularly in connection with working pumping and ventilating appliances), and some metallurgical works (chiefly in connection with furnaces in which a continuous heat has to be maintained).

"The third class of Sunday labour is very difficult to define, and still more difficult to limit, as what are considered necessities by one class are certainly not so considered by another." Mr. Maw thinks "that it will now be admitted by the vast majority that the maintenance of a healthy condition of life in large towns necessitates certain provisions for traffic and innocent recreation, which were quite unessential when life generally approximated more to that in our country districts."

After a few further extracts, Mr. Livesey continued his paper thus: I have quoted Mr. Maw's views at length, because such men's opinions are not often made public, and because this statement of the case is from one whose knowledge of industrial life and experience in the industrial world is equalled by few. Time is too precious to be spent on Class 1, or absolutely necessary Sunday labour. Class 2, or Sunday labour which has become necessary in consequence of the conditions of civilized life, and which could not be dispensed with without serious loss to the community, demands attention. In this connection, the vital question is: How much of all this work is really necessary, or how much can, by hearty goodwill on the part of those who control it, be dispensed with? In the reports of the Labour Commission, there is some very valuable evidence by Dr. Gritton on this point, by which it is made clear that at different works in the same industry there are very wide divergencies in the amount of Sunday labour. Ten thousand applications with proper forms for returns were sent out to employers in various industries; and of these 2200 were returned properly made out—coming from 17 branches of industry. Probably these returns were given mainly by employers whose sympathies were with the reduction of Sunday labour; those who were indifferent or careless on the point being unlikely to give information. The 2200 separate works are classed thus—

	Number of Works.	Total Number of Workers.	Number of Men at Work on Sundays.	Percentage of Total.
Brewing	198	7,653	617	8·07
Brickmaking	17	2,337	21	0·89
Building	5	1,715	4	0·23
Chemicals	143	10,491	536	5·11
Cotton	492	145,329	249	0·17
Engineering—				
Electrical	18	2,830	58	2·05
Mechanical	84	24,168	164	0·71
Municipal	43	5,756	460	7·99
Gas	292	30,477	5,506	18·00
Glass	45	5,951	99	1·68
Hardware	55	7,324	30	0·41
Iron and steel	112	34,242	3,127	9·13
Linen	22	8,891	7	0·08
Mining	283	77,057	1,549	2·01
Pottery	48	9,360	79	0·84
Shipbuilding	75	59 999	86	0·14
Woollen	268	55,803	113	0·20
	2,200	489,381	12,705	2·6% average.

Averages, however, are misleading; but the tables in the Labour Commission Report give, for each industry, the maximum of Sunday labour in the worst factory, and the minimum of Sunday labour in the best. It would be unfair to press this comparison too hard; for even in the same industry the circumstances and the nature of the work differ greatly in different works. But, speaking broadly, the figures in the following table undoubtedly indicate that, where the employer is anxious to reduce Sunday labour, the result is very different from those cases where such earnest desire does not exist. I have roughly divided the trades into two classes—viz., those in which the average number of men employed on Sunday is more, and those in which it is less, than 1 per cent. of the total—the smallest works being omitted. The figures $\frac{50}{70}$ mean that, out of a total of 70 men employed, 50 work on Sunday; the other figures ($\frac{5}{7}$) by their side are inserted to simplify the comparison with other trades.

Average.	Percentage of Sunday Work. Maximum in Worst Factory.	Minimum in Best Factory.
Over 1 Per Cent.		
Brewing	$\frac{50}{70}$	$\frac{1}{100}$
Chemicals	$\frac{6}{10}$	$\frac{1}{500}$
Engineering (electrical)	$\frac{3}{16}$	0
" (municipal)	$\frac{3}{16}$	0
Gas	$\frac{3}{12}$	$\frac{1}{300}$
Glass	$\frac{1}{10}$	$\frac{1}{25}$
Iron and steel	nearly $\frac{1}{2}$	$\frac{1}{200}$
Mining	$\frac{1}{111}$	$\frac{1}{365}$
Under 1 Per Cent.		
Brickmaking	$\frac{1}{62}$	0
Building	—	0
Cotton	Apparently only watchmen.	
Engineering (mechanical)	$\frac{1}{150}$	Watchman only.
Hardware	$\frac{1}{100}$	do. do.
Linen	Watchman only.	0
Pottery	$\frac{1}{10}$	Watchman only.
Shipbuilding	$\frac{1}{150}$	do. do.
Woollen	$\frac{1}{200}$	do. do.

My desire in compiling this table is to bring out clearly and strongly the contrast between needful and needless Sunday work. Granting, for the sake of argument only, that breweries are necessary under present conditions, I take them as an illustration. Particulars were obtained from 198 breweries, employing from under 10 up to 1500 men. There are three averaging 70 men each, of whom one employs 50 men and another only 1 man on Sunday; while the third has 10 men at work. Why this great difference? Surely it is a fair inference in a trade where the product is much the same, and the circumstances cannot be very different, that more than 40 out of the 50 in the worst case must be needlessly employed, and that their work could be dispensed with if the employer only had the will.

Iron and steel works, chemical industries, and mining differ from such as breweries in that at different works the conditions vary considerably. In some of them, Sunday work is necessary, while in others it is not. Consequently, it would be unfair to draw the inference that because in one works only 1 man in 500 is employed on Sunday, all the other works might do the same. It may, however, justly and certainly be said that in many of those where Sunday work goes on, more could be done to reduce it if there were the will. Sir David Dale informs me that 50 per cent. of the men working blast furnaces have rest on Sunday—this being as much as is possible.

I take gas-works last. In Dr. Gritton's list it appears that 18 per cent. of the men, on the average, work on Sundays at those works which gave returns. Up to about 1870 (or some 60 years after gas was first supplied), the work in the retort-houses was precisely the same on Sundays as on week-days; but the remaining third of the men engaged on other work always had their day of rest. The heat of the retorts cannot be let down, except when they are put quite out of use. Consequently, as the men did not ask for it, the idea of suspending gas-making on Sunday did not occur to the managers until Dr. Gritton, then Secretary of the Lord's Day Observance Society, with excellent judgment and tact, moved in the matter. He induced the Engineers of ten or twelve of the then London Gas Companies to discuss the question with him, and found them willing to co-operate. Others, in different parts of the country, became interested; and in a few years not only throughout London but in many other places gas-making was suspended on Sundays for twelve hours, from 6 a.m. to 6 p.m., all the stokers being relieved from work—getting twenty-four hours off instead of twelve as heretofore. The heat of the retorts, however, had to be maintained; and for this purpose labourers from the yard took turns—one labourer relieving, perhaps, five or six retort-house men. The Siemens system of firing has since been adopted, whereby the number of men required to attend to the fires has been greatly reduced, both on week-days and Sundays. Thus, an improved method of working has considerably reduced the necessary Sunday labour. The adoption of the eight-hour or three-shift system in place of two shifts in the twenty-four hours has also benefited the stokers. In many works, for a great part of the year, gas-making can be, and is, suspended for sixteen hours, from 6 a.m. to 10 p.m.; the men thus getting thirty-two hours off duty. This suspension of gas-making costs money—the wages of the men who attend to the fires, loss due to the stoppage, and it does not improve the retorts. These items are tangible, and are a chief reason why the system has not become universal. There are important places where, after 30 years of agitation and persuasion and example by those who have adopted the system and others, municipal gas committees, boards of directors, and managers of gas-works still—for these utterly insufficient reasons, and other paltry excuses—deny to their stokers the great boon of rest on the Lord's Day. They cannot see the set-off on the other side to the actual money cost or loss—that there is money value in obtaining a better class of men, who are also rendered more fit for their work in the week by the Sunday rest. It has been said, and with truth, that, in this way—even on the material ground of money value—the gain from Sunday rest exceeds the loss, not to speak of higher considerations. It is very much the fashion to blame employers (there are both bad and good); but the initiative in this and other movements for the benefit of workmen has come, as it ought to come, from the employers. They know that any kindly consideration shown to their men tends to make them happy and contented.

My experience with, and knowledge of, trade unions has not been of a favourable character; but I am bound to say that, in this matter, their efforts and influence have been directed to the reduction of Sunday labour. One of their plans is to greatly increase the Sunday pay. But this is a two-edged sword when carried too far: It is an inducement to the employer to avoid, but it leads some men to desire, Sunday work. The retort-house work is now suspended in many works for sixteen hours

in the summer, which is as much as is practicable in most cases. There is, however, the necessity for great and constant vigilance by the management to prevent a relapse, which generally takes the form of effecting repairs of machinery during the Sunday stoppage—repairs that, with forethought and taking a little trouble, might, to a considerable extent, be done on week-days. This remark applies generally, and not to gas-works only.

To some extent railways come under Class 2, because undoubtedly a certain amount of Sunday work is unavoidable. The railway system is so complicated that only experts can speak with any authority on that point—certainly I have no right to give an opinion. I may, however, conclude this part of my subject by saying that, so far as my experience and information go, it seems clear that a gradual reduction of Sunday labour in the industrial world has been going on for many years. There is still much to be done; but the general tendency of both employers and employed is in the direction of reducing Sunday work to the lowest practicable limit.

Needless Sunday work in manufacturing industries appears to be slowly—too slowly—diminishing. In employments that minister to recreation and pleasure, a rapid increase is apparent. Those of us who regard the day as sacred—its only true and certain safeguard—must feel that we are not doing all that might be done to reduce Sunday labour. Those who do not so regard the day may be earnestly and kindly reminded that a day of rest is a human necessity, and that none have the right needlessly to require another to surrender this inestimable boon—a priceless gift of God to man.

NEW PURIFYING PLANT AT THE IPSWICH GAS-WORKS.

The Ipswich Gas Company have a commendably attractive way of taking the members of the Corporation into their confidence, and of cultivating an amity which promises to be enduring, notwithstanding the fact that the two bodies are likely ere long to be rivals in the supply of illuminants. Whenever an opportune occasion arises, the Directors of the Company invite their municipal friends to visit the gas-works to see the provision made to enable them to faithfully comply with their statutory obligations. And in a town where the increases of business now reach an average of something like 12 per cent., the Directors and their Engineer are perforce compelled to be constantly extending or renewing one or other of the sections of their plant, in order that the demand may not overtake their supplying capability. Thus it happens that at Ipswich, the Company have on more than one occasion within our recollection found convenient opportunities for inviting some of the principal members of the Corporation to view the works, and afterwards to entertain them in a social way. By the former proceeding knowledge is imparted as to the thorough manner in which the Company conduct their work; and advantage is taken of the latter to exchange opinions on matters which must tend to benefit the consumers and the town generally. Last Thursday was such an occasion; and the inspection of a considerable extension of the purifying plant was a worthy object. To join in the visit, the Chairman (Mr. G. A. Biddell) and the Directors invited the Mayor (Mr. E. P. Ridley) and members and officials of the Corporation, as well as some of the professional friends of the Engineer and Secretary (Mr. J. T. Jolliffe). The Contractors for the plant (Messrs. C. & W. Walker, Limited) were represented by Mr. Alfred Featherstone, the Managing-Director, and Mr. W. Chaffer, who had the supervision of the work; and altogether it was a goodly party that assembled at the Company's offices at noon in response to the invitation. A number of carriages conveyed the company to the gas-works; and after witnessing the drawing and charging of retorts, they at once proceeded to view the special object of the visit, under the guidance of Mr. Jolliffe and Mr. F. Prentice, the Works Manager.

A cursory glance round the new purifying-house and its contents was sufficient to impress one that the designer (Mr. Jolliffe), his workmen who built the outside structure, and the Contractors, had one and all done their work thoroughly well; and this impression was confirmed by a more minute examination subsequently. The new house is built lengthwise on to the old one; and what was previously an outer wall of the latter, having been strengthened, now forms a partition (with openings) between the two buildings. The new structure is of red brick, with arched windows, bays, and entrances, relieved by stone sills and corbels. The roof is 63 feet span by 125 ft. 1½ in. long inside the walls. The principals are fixed 7 feet apart, and are constructed with rafters of double steel angles back to back, with main and secondary tie-bars and struts all of flat steel. The centre tie-bar of each principal, on which the conveyor trough (to be afterwards described) is fixed, is supported from the apex by two 1-inch diameter rods. The principals are braced together by diagonal wind ties; and the roof is covered with Duchess slating, on laths of angle steel, excepting the ventilator which is glazed. A noticeable feature of the building is the ample provision for ventilation. High up at either end there are three arched openings; on a level with the purifiers (which are elevated) there are in the side wall three bays; and on the ground level there are four bays or entrances in the side wall and two at one end. Between the bays are arched windows. The most scrupulous taste for airiness and light in buildings devoted to purification will find satisfaction in the ample provision made in this new example. The dimensions of the house are: Length 126 feet, breadth 63 feet, and height to the eaves 26 feet. Without elaboration or extravagant expenditure, Mr. Jolliffe has certainly secured a neat, sightly, and solid building for his new plant.

Within the house there is no waste space. The purifiers, which are of cast iron, are in one block, 120 ft. long by 60 ft. wide, divided by transverse partition-plates into four boxes, each 60 ft. by 30 ft. by 5 ft. deep inside. They are supported on a girder floor, constructed of rolled steel joists, 18 inches deep, fixed transversely across the purifying-house on two lines of cast-iron columns, with moulded caps and bracketed base plates, held down to solid concrete piers by 1½-inch foundation bolts and plates. On the top flanges of the 18-inch joists are fixed lines of longitudinal steel joists, 10 in. by 6 in. (running the full length of the building), on which the bottom plates of the purifiers are laid. The top plates—forming a central gangway 5 ft. wide the full length of the purifiers, and also affording a passage 5 ft. wide round each of the two covers, are supported and held down by means of a series of square cast-iron standards, which are also arranged to carry the T steel sieve-bearers. All the flanges of the plates are machine-planed; thus securing accurate and well finished work. Each purifier is fitted with four tiers of wood sieves and bearers for lime. Provision is made for the discharge of the foul lime through the bottom of the purifiers, by means of two shoots made in short lengths, so that, as each tier of sieves is cleared, a length of shoot can be lifted out, leaving a level opening for the discharge of the next tier. The top of each purifier is provided with two openings, 22 ft. 6 in. by 20 ft., fitted with steel covers. Mr. Jolliffe has adopted, instead of water-lutes, the system of india-rubber joints introduced by Mr. Henry Green, of Preston. The covers are constructed with a strong curb of angle steel, and T steel rafters in the crown, with angle purlins for supporting the sheets. They are secured to the return flange cast on the top plates by 1-inch bolts, spaced about 20 inches apart all round the curb. The purifier-covers are raised and lowered by an overhead traveller, spanning the full width of the purifying-house, and running on rails and girders carried by brick piers built up inside the walls. The traveller is arranged to lift or lower the two covers of each purifier at one operation. The lifting and travelling gears are both worked from the central passage or gangway on top of the boxes by means of chain wheels and hand chains, and the two covers can be lifted and travelled clear of the purifier in less than ten minutes. The purifiers are worked with an 18-inch Weck patent centre-valve, whereby one, two, three, or all four purifiers can be in use at one time. The inlet connections are 18-inch cast-iron pipes laid underground, and having two 14-inch rising-mains, 35 feet apart, branching from the 18-inch to secure even distribution of the gas over the large area of the purifier. There is one outlet-pipe, 18 inches diameter, from each purifier to the valve. All the connections except the vertical inlet and outlet pipes are laid underground; thus saving head-room without obstructing the floor-space, which is required for storage and slaking of lime, &c. The lime, after being prepared on the ground floor, which is level with the yard, is mechanically lifted and discharged into the purifiers above by means of an elevator fixed at one end of the house, and driven by a 12-horse power Crossley gas engine. The elevator delivers the lime on to a push-plate conveyor working in a trough, running the full length of the purifiers, and supported by the tie-bars of the roof, which was constructed with special provision for this purpose. At the centre of each purifier the lime is delivered into a steel hopper and shoot, from which it is discharged into either of the openings in the top plates of each box. The shoots, when not in use, are drawn up under the conveyor. It will be seen that good use has been made of the space at disposal inside the house; the boxes being only 3 feet less than the width of the house and 5 feet less than the length; the latter space being necessary for the working of the elevator. The whole of the iron and steel work throughout was supplied and erected by Messrs. C. & W. Walker, Limited, of Donnington.

From this general description, it will have been gathered that the house is a very complete one; and it brought down upon its projector and the firm who carried into effect his designs an abundance of praise from the visitors last Thursday. The plant is capable of dealing with 3 million cubic feet of gas per 24 hours, which is far in excess of the present make; but it really forms part of a scheme (which is being carried out as the progress of the business demands it) of duplication of the works. The total cost of the house and plant has been about £7000. It may be mentioned that, in the old purifying-house, there are eight purifiers, 20 feet square; and these will ultimately be converted into four large purifiers 50 feet by 20 feet. Then the new set will be used for lime; and those in the old house for oxide.

At the close of the inspection, the party returned to the gas offices, where they were entertained by the Chairman and Directors to an excellently served luncheon. At its close, a little speechmaking was indulged in. The Chairman thanked the Mayor and his colleagues for the honour they had done the Company in inspecting the new purifiers. He trusted that what they had seen had convinced them that the Company were doing all they could, and were sparing no expense, in putting up the best modern plant to enable them to efficiently meet the increasing demand for gas, and that their customers and the public generally would recognize that they were determined to keep to the fore in this respect. He trusted that nothing would ever occur to ruffle the existing good feeling between the Directors and the Paving and Lighting Committee. His Worship thanked the Chairman and Directors for having given them the opportunity of inspecting the works. Alluding to the prospect of the Corporation becoming competitors, he said he recognized that they would have formidable rivals; but as long as the Chairman and Mr. Jolliffe were connected with the Company, he was certain they would always have honourable opponents. While not opposed to the electric light itself, he was antagonistic to the Corporation entering into the business; and, from personal experience of the usefulness of gas, he predicted that it would enjoy a continually increasing demand. The Chairman next expressed his hearty congratulations to the Contractors upon the workmanlike way in which they had carried out the work. He was glad the Directors entered into the contract some eighteen months ago before the price of material rose to the extent it had since done. Mr. Featherstone acknowledged the courtesy and kindness the firm had received from the Directors and Mr. Jolliffe during the execution of the contract. He mentioned that at the time the contract was entered into, the price of pig iron was 49s. 9d., while to-day it was 75s. Steel was then £6 15s.; and now it was £9 10s. Mr. H. W. Raffe, the Chairman of the Corporation Paving and Lighting Committee, in proposing the toast of "The Chairman and Directors of the Company," referred to the large increase of the business by means of the prepayment meter system, and spoke of the great nuisance which this caused by the constant opening of roads. Believing that this great extension of business would soon mean the laying of larger mains, he suggested that this might be done before the streets were pulled up for laying the electric light cables and relaying the tramways. He hoped the Corporation would continue to use gas for lighting the streets, as he did not think they were adapted for electric lighting. The Chairman, in responding, referred with satisfaction to the fact that, according to the reports of the Corporation Gas Inspector (Mr. E. C. Sayer), there had been nothing to find fault with in the gas supply for some years past. Mr. D. Ford Goddard, M.P., also responded; remarking that the principle which had made the Company so prosperous, and the principle which alone could make gas companies prosperous in these days, was that of

looking ahead and going forward. What they had been inspecting was the result of carrying out this policy. The constant breaking up of roads for the purpose of laying pipes had, he remarked, always been a sore point; but it was an inevitable difficulty in any town that was growing. He suggested that the only way to overcome it was for the Corporation to put down proper conduits.

The gas engineers present had not an opportunity of publicly expressing their appreciation of the privilege which they had enjoyed of inspecting the plant, and afterwards sharing in the generous entertainment; but before leaving they did so individually.

METROPOLIS GAS SUPPLY.

Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied to London during the quarter ended Sept. 30.

The average illuminating power in standard sperm candles and the average amount of sulphur impurity present in the gas at each testing-station were as follows :—

	Illum. Power.	Sulphur.
The Gaslight and Coke Company—		
Fenchurch Street, E.C.	16·6	12·4
Kinghorn Street, Cloth Fair	16·5	9·5
Dorset Buildings, Salisbury Square	16·3	10·4
Millbank Street, S.W.	16·7	8·2
Ladbroke Grove, W.	16·6	12·0
Vincent Terrace, Islington	16·5	12·5
Camden Street, N.W.	16·6	11·9
Graham Road, Dalston	16·8	11·8
Kingsland Road, N.E.	16·9	10·7
Spring Gardens, Charing Cross	16·4	9·5
Vinery Villas, St. John's Wood	16·3	11·1
Lambeth Road, S.E.	16·4	8·5
Hornsey Road	16·2	7·7
George Street, Hampstead	16·6	12·0
Commercial Gas Company—		
Wellclose Square, E.	16·4	8·6
South Metropolitan Gas Company—		
Hill Street, Peckham	16·8	10·1
Bedford Road, Clapham Road	16·4	12·4
Stoney Lane, Tooley Street	16·7	11·6
Lewisham Road, S.E.	16·5	11·1
Blackfriars Road, S.E.	16·6	11·4
Burrage Road, S.E.	16·8	11·2

It will be seen from these results that the average illuminating power at all the testing-stations has been higher than the parliamentary standard. Sulphuretted hydrogen has not been present in the gas at any of the testing-stations. The average amount of sulphur in other forms than this was considerably less than the quantity permitted at all the testing-stations. The limit allowed—viz., 17 grains—was only exceeded on three occasions during the quarter. Ammonia has generally been present in the gas throughout the quarter, but only in slight quantities.

THE PRICE OF GAS AT MIDDLESBROUGH.

An Advance of Twopence—A Close Vote.

A short time since a recommendation of the Middlesbrough Gas Committee to the Council to sanction an increase in the price of gas by 2d. per 1000 cubic feet was not accepted; being referred back for further consideration by 18 votes to 13. The Gas Committee formed the same decision on reconsideration, and again recommended, at the Council meeting last Tuesday, an increase to 3s. per 1000 feet and a discount of 10d., the increase to date from the 1st inst.

The adoption of the minutes having been moved by Alderman Hugh Bell, a counter amendment was proposed. Showing cause why an increase was unnecessary, Mr. Buller said the additional revenue from residuals would be sufficient to meet the increased cost of coal, which he held was not £5000, but £3000. He had said that the contracts for oil were most advantageous, but found on further inquiry that £500 more would be required in that direction. They had passed five months of the year on the old contracts; so that even £3500 would not be the increase in cost of materials for the next seven months. He was quite satisfied that, at the end of the year, there would be a small margin in hand should nothing unexpected happen. He was sorry to say that, from the way he looked at the cost account which had been presented, and comparing it with others, there was a very unsatisfactory state of things; and he did not think it gave a right idea of what had actually transpired. On the whole, he believed the income would be much nearer £15,000, as estimated, than the official statement pointed to. Alderman Archibald would, after such a statement, which was a very grave one, have wished the amendment had been to refer the matter back to the Committee. An explanation was demanded before they could vote on the matter. They had never yet had an explanation as to how the £15,000 income had been put in the estimates. The Chairman and the Gas Manager ought to have been consulted on such a matter. It was very bad finance; and the whole thing tended to destroy one's confidence in the management. Alderman Wilson said so far as the Finance Committee were concerned, it was only put in after consultation with the Gas Manager. There was some indication of a rise in coal; but the extent was not foreseen in March when the estimates were prepared. He considered it essential that each Committee should keep within their estimates; and on this ground he believed, if it was necessary to increase the price of gas, it should be done.

But for the direct challenge of Alderman Archibald, Alderman Bell said he should not have felt called upon to prolong the discussion. The Committee consisted of 33 members; and they had on two occasions discussed the matter, so that he should have thought there had been ample time to raise all points. He was called upon to defend their action on two grounds—self-contradictory, he might say. As to the £15,000, they were never desired to say what the gas revenue was likely to be. When called upon to frame their estimates, they took the proceeds of the preceding year, and thought they might gain a little more. The second point was that the estimate was right, and that the revenue would come to £15,000. Thus the two statements were contradictory. He had entirely failed to follow the argument of Mr. Baker, who, with many words, had overlaid a commonplace fact. The simple statement was that they had to pay 2s. 7d. per ton more for coal than last year. Mr. Terrace had put the figures at £3500, and £1500 was for other matters. He could not see that anything in the cost account or anything else could get over this. He found no fault with Mr. Baker's remarks, except that they were untimely; and it was difficult to be able to correct items referred to without a moment's notice. The discussion had been unfair; but he did not think it was wise to refer the matter back, as thereby they would lose a quarter's increase.

The voting showed 17 against non-confirmation and 10 for. A further amendment to refer the matter back was moved; but several members who had been neutral in the first vote, and one in favour of non-confirmation had left the chamber before the second vote was called. The result was 15 for confirming the minute, and 14 for referring it back. The increase of 2d. was therefore carried by a majority of one.

THE QUESTION OF METER-RENTS AT CARLISLE.

The question of the abolition of gas-meter rents was under the consideration of the Carlisle Town Council at their meeting last Tuesday. In the first place, it appeared from the minutes of the Gas Committee that the Engineer (Mr. C. B. Newton) had reported on the method adopted in dealing with meters belonging to consumers in several towns where the charge for meter-rents had been discontinued.

Mr. Burns, in accordance with notice, then proposed—"That the Council consider the question of meter-rents, and as to whether the time has not arrived when such might be abolished, and that it be an instruction to the Gas Committee to consider as to the best means of carrying the same into effect." It appeared, from Mr. Burns's opening remarks, that seven years ago he pledged himself to make an effort to secure the abolition of meter-rents; but so far, although the matter had been mentioned on more than one occasion in the Council, nothing had been done. He thought it was somewhat of an injustice to charge consumers for the use of the instrument without which the Corporation could not sell the gas; and he did not know that they would find a more opportune time for making a change. He learned from the accounts that the amount received as meter-rent for the year ending June 30 was £920. Gas at 2s. 3d. per 1000 cubic feet brought in £29,208. Therefore a penny represented a total of £1082; so that meter-rentals realized nominally rather less than at the rate of 1d. per 1000 cubic feet, though in actual working, in many cases, they amounted to more than that sum. Take, for instance, a cottager using (say) 10,000 cubic feet of gas a year. His meter-rent was 2s. per annum; and he thus paid in meter-rent at the rate of about 2½d. per 1000 cubic feet on the gas he consumed. This, he contended, was an undue pressure on the small consumer, from which he should be relieved; and if the Council could see their way to adopt the resolution he had read, and grant the concession, they would earn the gratitude of the great majority of consumers, without doing any injustice to the large consumers, or materially affecting the income of the gas-works. In the case of the small consumers, there was no doubt that many of them had paid the cost of a meter in rent, and yet they had no claim upon it, and had still to continue paying their 2s. annually. This seemed to him an additional reason why these rents ought to be abolished. With regard to the consumers who did not pay rents, but who were the owners of the meters they were using, a special arrangement would have to be made. He believed an ordinary wet meter should last somewhere between 20 and 30 years—probably 25 would be a fair allowance—while a dry meter would not last much over half that time. He suggested that the Corporation should purchase these meters from the several owners, and that a basis of ten to fifteen years be adopted—*i.e.*, if a meter had been in use ten years, the Corporation would have to pay five-fifteenths of the value, or as the case might be. He understood that there were about 500 of such meters in use; but under the proposed arrangement there would not be more than 100 to purchase, if so many. If they took the amount payable for each as between 30s. and 40s. on an average, it would mean an outlay of from £150 to £200, which amount surely could not be said to be prohibitive, and should not be allowed to prevent the carrying out of a scheme which would be so beneficial to the many. Some gentlemen might say, Why not reduce the cost of gas 1d. per 1000 cubic feet instead of abolishing meter-rents? He had carefully considered this matter; and he saw that, if it were adopted, the small consumer, whom he wished to benefit, would not be relieved to half the extent he would be by the abolition of the meter-rent.

The motion was seconded by Mr. French, and was supported by four other speakers, after which the Mayor (Mr. G. White) made the suggestive inquiry whether any other November candidate wished to speak. Mr. Collin observed that he could win his seat without any such dodges. Mr. Corbett referred to the inquiries that were being made on behalf of the Gas Committee, who, he said, would be only too happy to abolish the rents when they saw it could be done satisfactorily. Mr. Coulthard expressed his preference for a reduction of 2d. in the price of gas rather than the abolition of the meter-rents. In the course of further discussion, Mr. Lightfoot suggested that the motion be altered so as to refer the matter to the Committee for consideration. Mr. Scott, while sympathizing with Mr. Burns, pointed out that the information before the Gas Committee was at present insufficient for them to come to a conclusion; but in another month or so they would be able to put the whole question fully before the Council. Mr. Atkinson thought the present system of charging meter-rent was unfair. For small consumers it amounted to 25 per cent. on the gas consumed, and to only 5 per cent. in the case of large consumers. Subsequently, a resolution drafted by the Town Clerk—instructing the Gas Committee to consider the desirability of abolishing the meter-rents and to report thereon at an early meeting—was carried. The Mayor remarked that he was sure, after the expressions of opinion during the discussion, the Gas Committee would take the subject into their favourable consideration.

NATIONAL FREE LABOUR ASSOCIATION.

Its Measure of Success.

The Annual Congress of this Association was held last week, in the Memorial Hall, Farringdon Street, E.C. The report which was presented at Monday's meeting afforded sufficient justification for the existence of such an organization. It appeared that, during the past year, the Association were called upon in the case of 26 strikes and disputes, in all of which the differences had been successfully arranged by the only method known to them as being businesslike and economically sound—the law of supply and demand in the labour market. On this basis in the course of the twelve months employment had been found for 5769 workmen willing to accept the current rate of wages, with which others were dissatisfied. The total registered membership was now 253,501. During the year 279 employers had made application to the Association for workmen; and arrangements had been made with thirteen large engineering firms to supply them entirely with non-Union labour. The General Secretary (Mr. W. Collison) stated that he had received a letter from Mr. George Livesey (the Chairman of the South Metropolitan Gas Company) enclosing a cheque for £10, his usual subscription. Mr. Livesey added: "I consider that the Association has been of very great service to employers and employed in checking Trade Unionism. The strong feeling shown by the Trade Unionists against you is the measure of your success." In his address, the President (Mr. John Chandler) congratulated the members on the fact that the principles on which the Association was founded had now attained almost unanimous assent and approval. As the natural result of Trade Union restrictions by coercion, orders for machinery, bridges, and locomotives had recently been sent out of this country, and given to outside manufacturers. Resolutions were afterwards passed denouncing picketing, urging the addition of a representative of free labour to the Labour Department of the Board of Trade, and protesting against an eight-hour working day as an interference with individual liberty.

COMMERCIAL EDUCATION IN BIRMINGHAM.

The following is a summary of some of the points of general interest in a report recently presented to the Birmingham Chamber of Commerce by their Education Committee, upon commercial education in the city.

The Committee first report in detail upon the extent to which commercial subjects are at present taught in the existing public schools in Birmingham, supplementing the information with an elaborate and interesting appendix containing a complete time-table of each of the schools, together with a time-table of a typical German commercial school, a report of the congress on commercial education which was held this year in Venice—at which, it will be remembered, Sir Henry Wood read a paper noticed in the "Journal" for the 11th of July—and a report on the school system of Hamburg. The result of their investigations into existing institutions in England, and of their comparison of the facilities for commercial education thereby afforded with the systems adopted by our foreign competitors in trade, is a conviction that, in this respect, England is behind other countries, and that, in order to enable our merchants, manufacturers and their employees to hold their own against foreign competition, our system of commercial education must be made much more thorough and effective than it is at present.

The report proceeds: "The rapid development of manufactures on the Continent, and in the United States, has so entirely changed the conditions of trade during the last 20 or 30 years, that we no longer hold unchallenged the position of the leading manufacturing nation of the world. But the fact that, till comparatively recent times, we have been the leading manufacturers and distributors of merchandise in the world, has had the effect of making our manufacturers and workpeople less ready than they ought to be to adapt themselves to the needs of other countries, as also less ready to extend their experience and learn what other nations are doing. In former times other nations had to adapt their requirements to what they were able to obtain from us, and we had no need to study their requirements. They had everything to learn from us, and we had nothing to learn from them. Now this is entirely changed. While other nations have shown themselves apt scholars in all that we had to teach, we have now a great deal to learn from them."

The question the Committee had, then, to consider was how best to secure the better preparation of all sections of the rising generation, subordinates as well as principals, for the task of learning from, and competing with, our shrewd competitors; and their recommendations are, shortly, as follows: (1.) That the present teaching of geography should be supplemented by frequent illustrated lectures, in order to familiarize the pupils with the conditions of life and the articles used and produced in other countries. (2.) That much more time should be given to, and more efficient teachers provided for, the teaching of modern languages—especially German. There are, says the report, probably few countries where a boy leaving a higher school knows so little of modern languages as the average English boy knows. The Committee do not admit the claim of the dead languages to provide better mental training than the modern; and they remark that in Germany modern languages are esteemed highly for the mental training they afford, and that it will surprise English people to learn that in the commercial city of Hamburg, out of 124 public schools, Latin is only taught in three, whereas modern languages are taught in all. (3.) That in Birmingham (where it is proposed to create a Faculty of Commerce in the new University) one of the Grammar Schools should be devoted to a purely modern education.

The Committee, further, urge upon employers the necessity of requiring a definite standard of commercial knowledge in all applicants for situations; and they define what, in their opinion, that standard should be. They suggest that a boy, entering business at 15 or 16, should, in addition to the possession of a thorough knowledge of commercial geography and of at least one foreign language, also write a good hand, have a good knowledge of the whole of arithmetic, and be well-grounded in the principles of bookkeeping.

For reasons given the Committee consider that the changes they advocate might be introduced into the curriculum of our schools without detriment to their efficiency for mental training and general culture.

THE ELECTRIC LIGHTING CLAUSES ACT.

Dealing with the legislation of the past session, in "The Times" last Friday, the Editor of "Chitty's Statutes of Practical Utility" points out that, out of more than 300 Public Bills submitted to Parliament in the past session, which came to an end in August last, only 51 received the Royal Assent. Of these, about half either apply to Scotland or Ireland only, or from various causes are of little or no interest either to the general public or even to lawyers. The remaining portion comprised new departures in the law of London Government and London Water Supply, besides other less important amendments of previous statutes. He subjoins an account of this remaining portion, supplying, where necessary, "the information which the Legislature gives by reference only to previous statutes, and which themselves, in turn, frequently and in a tiresome way incorporate other statutes." His account of the Electric Lighting Clauses Act is as follows:—

The Electric Lighting Clauses Act is framed upon the system first set on foot in 1845 by the Companies Clauses, Lands Clauses, and Railways Clauses Consolidation Acts, of comprising in one General Act sundry provisions, usually introduced in numerous Special Acts passed for the same purpose, with the laudable objects (as declared in the preambles of the Acts) of both avoiding the necessity of repeating such provisions in each of the several Acts and of ensuring greater uniformity in the provisions themselves. Electric lighting, though pretty fully dealt with by a General Act of 1882, has very frequently required further special legislation either by Provisional Order of the Board of Trade confirmed by statute or by statute not preceded by such Order. The new Act, in two short sections and a lengthy schedule, presents promoters and other parties interested with a model code which is to be deemed incorporated with every future Provisional Order and every future Special Act authorizing the supply of electricity, save so far as it may be expressly varied or excepted by the particular Order or Special Act itself. The code is contained in 80 clauses, incorporating bodily and applying to electricity numerous provisions of the Gas-Works Clauses Acts of 1847 and 1871, as to breaking up streets, waste of gas, and injury to meters; binding promoters to furnish sufficient supply of energy within the area of supply, and to supply energy to public lamps within the distance of 75 yards from their distributing mains; and directing that the prices to be charged for energy supplied shall not exceed those stated in the Special Order or Special Act, or, in the case of a method of charge approved by the Board of Trade, such price as the Board of Trade determine on approving the method. Other clauses provide at great length for the appointment of electric inspectors and the testing of mains; the ascertainment by meters of the amount of energy supplied; the provision of a map of supply annually corrected; and the revocation of powers in case of insolvency or inability to carry on an electric undertaking at a profit.

ELECTRIC LIGHTING NOTES.

The Harwich Town Council last Thursday agreed to an arrangement by which their Electric Lighting Provisional Order will be transferred to a local Company; the consideration being £300. The Company are to be debarred from parting with the powers to any other person or company. The Council also agreed to grant them certain facilities for carrying out an electric tramway scheme in the borough.

After much talk and hesitation, the Slough District Council have decided not to apply to the Board of Trade at present for an Electric Lighting Order; their opinion being that the area is not yet sufficiently large for a scheme to be carried out with any hope of profit. They have also decided to oppose any company who may apply for powers, on the ground that they intend to do so themselves "at some future time."

Electric lighting is to be extended in the streets of Shrewsbury by the addition of 24 arc lamps placed 60 or 70 yards apart. The estimated cost is £850. The number of gas-lamps displaced will be 41 ordinary and 11 large lamps, now lit at a cost of £260 per annum. The new lamps cost £641 per annum, but it is said they will give twenty times the amount of light. Are these calculations made with incandescent gas-lights? If not, why not?

The ratepayers of Ross have come to a very sensible conclusion regarding the expensive electric lighting scheme to which reference was made a fortnight since. They consider that, as the electric lighting of the district would, for a few years, be "in the nature of an experiment," it is undesirable to proceed with the scheme. At the same time they desire the Council to seek for a further reduction in the price of gas, and an improvement in the quality.

There was a long discussion at the meeting of the West Bromwich Town Council last Wednesday week on a recommendation of the General Purposes Committee that £30,000 should be borrowed for the purpose of laying down plant for the supply of electricity. It was stated by the Mayor (Mr. S. Pitt) that a large number of promises of support had been received from manufacturers and others, and the tramway authorities were prepared to take the whole of the electricity they required for driving the trams in the borough, if the lines were leased to them. The recommendation was adopted.

The Rhyl District Council last Tuesday discussed a recommendation that application be made for a loan of £21,000 for lighting the town and promenade with electricity, the purchase of land, and the provision of a refuse destructor. Three alternative schemes were submitted; and the Electric Light Committee advised the third, which for £14,517 would provide 36 arc lamps to light the two promenades, Marine Drive, and principal streets, as well as 2400 lamps of 16-candle power for private consumers. Some of the members urged caution in the matter; and, on a division, the recommendation was rejected. But it is likely to be brought before the Council again on an early occasion.

The Mayoress of Halifax, Mrs. J. T. Simpson, last Friday performed the duty of starting two turbines which have been erected at the Corporation electricity works. They are each of 400-horse power, and have cost a total of £7000. It is intended to use them principally for the tramway service. It was stated by the Chairman of the Gas and Electricity Committee (Alderman Woodhead) that the enlarged premises would give accommodation for machinery equal to 25,000-horse power, in place of the

existing 2500-horse power. He was sanguine that, at the end of the present financial year, they would be able to reduce the price per unit from 5d. to 4d. He also hoped that the price of gas, the consumption of which was greatly increasing, would be reduced from 2s. to 1s. 10d. per 1000 cubic feet net.

The main streets of Cardiff furnished, on Monday evening last week, another striking exhibition of the unsatisfactory condition of the electric light service; there being complete extinction in many of the lamps. In commenting on the failure, the "South Wales Daily News" makes a sensible suggestion in the following sentences: "Long months, even years, of perpetual pottering not having sufficed to obtain a trustworthy system of electric lighting for the town, it might perhaps be well if the apparently unthought-of expedient of lighting the gas-lamps were promptly resorted to upon these periodical recurrences of breakdown. At any rate, it would be safer for traffic." Our contemporary reports that the same evening a large electric lamp at the top of Wood Street suddenly caught fire owing to the induction coil getting out of order, and at once there was a big blaze. This caused the leaden framework of the lamp to melt, and the flames to burst through the top of the shade, producing a remarkable spectacle of various colours.

Whitechapel, Mile End, Limehouse, and St. George's-in-the-East are soon to be merged in one borough; and it is felt there should be a uniform system of lighting. The Whitechapel Board are about completing an electrical installation; but the other three parishes have allowed the County of London Brush Company to obtain a Provisional Order to lay down mains. Two years have elapsed, and the Company have done nothing, and have only just given notice of their intention to begin operations. But one of the terms on which the Order was granted was that the work should be begun within two years, or the Board of Trade could revoke the Order. Limehouse and Mile End have consequently applied to the Board to revoke the powers; but the Board have replied to Limehouse that they do not intend to do so. The matter was considered at a conference of the Authorities concerned yesterday week, when a resolution was carried appointing a deputation to wait on the Board of Trade to demand that the Order should be revoked, and affirming that the lighting of the East-end should be carried out by the new municipal body.

Speaking at the inauguration of some new plant at the Southport Corporation electricity works last Wednesday, Mr. Thomas Jones, the Chairman of the Committee in charge, gave some account of the progress made since the commencement of the enterprise in 1894. The engines at the start possessed an indicated horse power of 250; while now engines were installed capable of working up to 2000 indicated horse power, and equal to the simultaneous supply of 40,000 8-candle power lamps. There were at present above this number of lamps connected; but not more than 50 per cent. were in use at one and the same time. Connections were now being made at the rate of 10,000 8-candle power lamps per annum. On March 31, 1895, there were 72 consumers, with 5000 lamps fixed; while now there were 600 consumers, with upwards of 40,000 lamps. The first capital expenditure was £15,000. It amounted in March last to £90,000; and more had been incurred since then. The income for the year ending March 31, 1896, was less than £2900; last year it exceeded £9350. The profits had also advanced from £175 in the first year to above £2000 in the last twelve months, after all liabilities had been met. At the same time the price had been reduced from 6·96d. per unit in 1896 to 4·07d. last year.

If we may believe Alderman Fortune, the maximum demand system of charging for the electric light will, at the prices proposed by the Town Council, prove a failure at Harrogate, but will work very advantageously for one consumer. The prices which have been adopted by the Council are: Under 15,000 units per annum, 6d. per unit for the first hour, and 4d. per unit afterwards. Over 15,000 units per annum, 6d. per unit for the first hour, and 2d. per unit afterwards. For cooking, heating, and power, 6d. per unit for the first hour, and 2d. per unit afterwards. Alderman Fortune, in moving at the last meeting that 6d. should be charged for the first hour-and-a-half instead of the first hour, said that the Engineer estimated a profit this year of £750. He was not satisfied with the resolution of the Council, because it simply meant the supplying of the new Majestic Hotel; and, according to the Engineer's report, if they did this, it would mean a loss of £53. He thought they should not make a reduction in the face of a probable heavy loss. The motion having been seconded, Alderman Chippendale said the electric light cost the ratepayers £1500 until March last; and Alderman Hudson pointed out that they were going to expend £28,000 on new plant, and would have to get £1000 per annum out of new customers or old ones. In face of these statements, the Council decided to abide by their proposal.

The foundation-stone of the Dudley Corporation electric lighting and power station was laid by the Mayor (Alderman G. H. Dunn) yesterday week. The present station is only a temporary erection of corrugated iron; and the plant, consisting of two Westinghouse automatic compound engines, with dynamos and boilers, is used entirely for generating power for the tramway. The new structure is to be erected over the existing station, and to the present plant will be added four more Westinghouse engines, dynamos, and boilers. Application has already been made to the Local Government Board for sanction to borrow £33,000 to carry out the scheme; and contracts for the permanent work and plant, amounting to £21,472, have been passed by the Council. After the little ceremony, the Mayor entertained the members of the Corporation and officials at a banquet, which was followed by speechmaking. His Worship defended the Electrical Committee for not having accepted the offer of the Midland Electric Corporation to supply the borough with electricity for lighting purposes. As the result of a thorough investigation of the whole matter, he was convinced that the Council had acted wisely in deciding to carry out a scheme of their own. He was very much averse to the Corporation handing over to the Company powers which belong to the ratepayers, and which, if properly applied, would be of great financial benefit to the community. The station now in course of erection would contain plant of 1200-horse power, and would be capable of generating above 6 million units of electricity per annum. Supposing they generated and disposed of only 500,000 units per annum, this would represent an income of £9000 and a considerable profit, as the charges in connection with sinking fund, renewals, and interest amounted to about £6500. He did not say they would make this profit at first, as it would take a few years to get into full working order; but he was convinced that eventually the whole of the profit would be in their hands.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 931.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 13	10½	Alliance & Dublin 10 p. c.	21½—22½*	..	4 13 4
100,000	10	,,	7½	Do. 7 p. c.	15—16*	..	4 13 9
300,000	100	July 3	5	Australian 5 p. c. Deb. .	102—104	..	4 16 2
200,000	5	May 12	6	Bombay, Ltd. . . .	6—6½	..	4 12 3
40,000	5	,,	6	Do. New, £4 paid .	4¼—4¾	..	5 1 1
880,000	Stk.	Aug. 16	12	Brentford Consolidated	277—282	..	4 5 1
270,000	,,	,,	9	Do. New . . .	210—215	..	4 3 9
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
159,375	,,	June 15	4	Do. 4 p. c. Deb. .	126—130	..	3 1 7
220,000	Stk.	Sept. 15	11½	Brighton & Hove Orig. .	255—265	..	4 6 9
226,320	,,	,,	8½	Do. A. Ord. Stk. .	190—195	..	4 7 2
973,500	Stk.	Aug. 16	5	Bristol, 5 p. c. max. .	125—130	..	3 16 11
430,000	20	Sept. 29	10	British	43—45	..	4 8 11
50,000	10	Aug. 31	12	Bromley, Ord. 10 p. c. .	24—26	..	4 12 3
75,000	10	,,	9	Do. 7 p. c. . . .	19—21	..	4 5 8
500,000	10	Oct. 13	6	Buenos Ayres (New) Ltd.	9¼—10*	..	6 0 0
220,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	100—102	..	3 18 5
150,000	20	July 13	8½	Cagliari, Ltd. . . .	28—29	..	5 13 10
100,000	10	Sept. 29	8	Cape Town & Dis., Ltd.	13¾—14¼	..	5 10 4
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	57—59	..	5 1 8
550,000	Stk.	Oct. 13	13½	Commercial Old Stock .	310—315*	+¾	4 5 9
200,750	,,	,,	10½	Do. New do. .	240—245*	+¼	4 5 9
200,750	,,	June 15	4½	Do. 4½ p. c. Deb. .	143—148	..	3 0 10
800,000	Stk.	June 15	10	Continental Union, Ltd.	182—187	..	5 7 0
200,000	,,	,,	7	Do. 7 p. c. Pref. .	182—187	..	3 14 10
51,600	Stk.	Aug. 31	14	Croydon A 10 p. c. . .	335—340	..	4 2 4
168,400	,,	,,	11	Do. B 7 p. c. . .	265—270	..	4 1 5
555,000	Stk.	Aug. 16	5½	Crystal Palace Ord. 5 p. c.	182—187	..	3 16 8
60,000	,,	,,	5	Do. 5 p. c. Pref. .	140—145	..	3 9 0
486,090	10	July 28	11	European, Ltd. . . .	21½—22½	..	4 17 9
354,060	10	,,	11	Do. £7 10s. paid .	15½—16½	..	5 0 0
14,993,075	Stk.	Aug. 16	4 p. c. light 3½ p. c. max. . and 4 p. c. Con. Pref.	Gas- Ord. . . .	103—105	..	4 13 4
2,500,000	,,	,,	8½		97—99	..	3 10 8
3,799,735	,,	,,	4		120—123	..	3 5 1
3,993,975	,,	June 15	3	Coke 3 p. c. Con. Deb.	99—101	..	2 19 5
70,000	10	May 31	8	Hongkong & China, Ltd.	13¾—14½	..	5 10 4
3,800,000	Stk.	May 12	10	Imperial Continental .	220—225	..	4 8 11
473,600	Stk.	Aug. 16	8½	Do. 8½ p. c. Deb. Red.	101—104	..	3 7 4
75,000	5	June 15	6	Malta & Medn., Ltd. .	5—5½	..	5 9 1
560,000	100	Oct. 2	5	Met. of 5 p. c. Deb.	110—114	..	4 7 9
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	108—110	..	4 1 10
541,920	20	May 31	5	Monte Video, Ltd. . .	12¼—13½	..	7 8 1
617,946	Stk.	Aug. 31	9½	Newc'tle & Gateshd Con.	225—230	..	4 0 5
264,855	Stk.	June 29	8½	Do. 8½ p. c. Deb. .	106—109	..	3 4 3
					* Ex div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
150,000	5	May 31	8	Oriental, Ltd. . . .	7½—8	..	5 0 0
135,000	5	,,	8	Do. New, £4 10s. pd.	6½—7	..	5 14 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	1½—1¾	..	4 11 5
60,000	5	Sept. 29	7	Ottoman, Ltd. . . .	5½—5¾	..	6 1 9
500,000	100	June 1	6	People's Gas of Chicago 2nd Mtg. Bonds.	102—106	..	5 13 2
851,070	10	Oct. 13	7	River Plate Ord. . . .	10¾—11¼*	..	6 4 5
250,000	Stk.	June 29	4	Do. 4 p. c. Deb. .	100—102	..	7 8 2
250,000	10	Sept. 15	10	San Paulo, Ltd. . . .	12¾—13¼	−1½	7 8 2
135,000	Stk.	Sept. 15	10	Sheffield A.	247—245	..	4 0 4
209,053	,,	,,	10	Do. B.	247—249	..	4 0 4
447,427	,,	,,	10	Do. C.	247—249	..	4 0 4
5,600,000	Stk.	Aug. 16	5½	South Metrop., 4 p.c. Ord.	137—140	..	3 16 1
1,520,000	,,	July 13	3	Do. 3 p. c. Deb. . .	101—103	..	2 18 3
120,000	Stk.	Aug. 31	6	Tottenham A. 5 p.c. and B. 3½ p.c.	141—143	..	4 3 11
250,520	,,	,,	4½		102—104	..	4 6 6
55,100	,,	—	4	Edmonton 4 p.c. Deb..	115—120	..	3 6 8
182,380	10	June 15	5	Tuscan, Ltd.	9—10	..	5 0 0
142,900	10	July 3	5	Do. 5 p. c. Deb. Red.	98—100	..	5 0 0
				WATER COMPANIES.			
746,184	Stk.	June 29	11	Chelsea, Ord.	313—318	..	3 9 2
150,000	,,	,,	5	Do. 5 p. c. Pref. .	163—168	..	2 19 6
160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	145—150	..	3 0 0
175,785	,,	Sept. 29	4½	Do. 4½ p. c. Deb. .	150—155	..	2 18 1
1,720,560	Stk.	Oct. 13	7	East London, Ord. . .	203—208*	−½	3 7 4
654,740	,,	June 29	4½	Do. 4½ p. c. Deb. .	152—157	..	2 17 4
390,000	,,	,,	3	Do. 3 p. c. Deb. .	101—103	..	2 18 3
700,000	50	June 15	7½	Grand 10 p. c. max. .	109—112	..	3 7 0
310,000	Stk.	Sept. 29	4	Junction 4 p. c. Deb. .	133—138	..	2 18 0
705,000	Stk.	Aug. 16	14	Kent	355—360	−2	3 17 9
160,000	,,	,,	7	Do. New, 7 p. c. max. .	208—213	..	3 5 9
1,043,800	100	June 29	10½	Lambeth, 10 p. c. max. .	300—305	..	3 8 10
406,200	100	,,	8	Do. 7½ p. c. max. .	225—230	..	3 9 7
350,000	Stk.	Sept. 29	4	Do. 4 p. c. Deb. .	136—140	..	2 17 2
500,000	100	Aug. 16	13½	New River, New Shares	430—435	−2½	3 2 0
1,000,000	Stk.	July 28	4	Do. 4 p. c. Deb. .	135—140	..	2 17 2
902,300	Stk.	June 15	7½	South-wark Ord. . . .	205—210	..	3 11 5
126,500	100	,,	7½	,, 7½ p. c. max. .	193—198	..	3 15 9
489,200	Stk.	,,	5	and 5 p. c. Pref.	165—170	..	2 18 10
1,019,585	,,	Oct. 13	4	Vauxhall 4 p. c. A Deb.	131—136*	..	2 18 10
1,155,066	Stk.	June 15	10	West Middlesex . . .	300—305	..	3 5 7
200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	152—157	..	2 17 4
200,000	,,	Sept. 15	8	Do. 8 p. c. Deb. .	101—103	..	2 18 3
					* Ex. div.		

Alderman Speight, the Chairman of the Gas and Electricity Committee of the Bradford Corporation, laid before his colleagues last Tuesday the results of the working of the Electricity Department during the half year ending on June 30. It appeared from his remarks that the total income was £13,256, as compared with £9565 in the corresponding period of 1898, or an increase of £3690. The total expenditure, including the charge for interest and sinking fund, was £11,523, as against £7907. This showed £3616 increase, which was due to the fact that the allocation of interest and sinking fund in the half year was unequal. The profit therefore amounted to £1732, as against £1658; being an increase of £74. The number of users of electricity was 965, as against 720, or an increase of 34 per cent. The total number of units consumed was 996,807, against 480,294, or an increase of 107½ per cent., irrespective of current supplied for the public lamps. This large increase was accounted for chiefly by the current supplied at 1d. per unit for the Bolton and Horton sections of tramway. These were responsible for 59½ per cent. of the increased consumption. The total profits since the opening of the electricity works, after paying interest and sinking fund, amounted to £22,616; and the total amount written off for depreciation had been £10,556—leaving £12,060 to be appropriated as the Council might direct. The trade profit—that was, the profit before charging interest and sinking fund—for the half year worked out to £4 3s. 11d. per cent. on a capital outlay of £180,129; and the net profit, after charging interest and sinking fund, showed a percentage of 19s. 3d. on the same outlay. Taking the twelve months ending in June, the trade profit amounted to £15,467, representing £8 9s. 6d. per cent. per annum on the capital outlay. Alderman Speight wound up his statement with a further example of the unreliability of the electric light. He said that, on the previous Saturday night, a very serious "burn-out" took place in three of the cables in the centre of the city. He did not like to say what was believed to be the cause of this damage, without further inquiry. But the three cables in question were completely burned out, even their armour-plating being destroyed. The men were got to work early on Sunday morning, and new cables were laid down at once; and by the evening everything was working as if nothing had happened.

The Singapore Municipality have received a report from Mr. H. R. J. Burstall, of the firm of Messrs. Burstall and Monkhouse, of Westminster, on the subject of electric lighting; but the document, we venture to think, will cause the Municipality to hesitate before they adopt a scheme the issue of which appears to be of a particularly precarious nature. The district proposed to be supplied has been divided into central and external areas, the latter extending over wherever the Gas Company's mains are laid. The houses in the central district are in part of the area closely built; but for the greater part of the external area they are widely separated. The number of lights to be expected per yard of road must be very small; and therefore the cost of cables is high in comparison with that in most European installations. For this reason also, it will be necessary to use the highest safe electric pressure for the purpose of reducing the weight of copper in the mains. Street lighting is proposed to be by 32-candle power electric lights at 90 yards distance; the principal streets to be lit with arc lamps of 2000 nominal candle power, at about 100 yards apart. It might, the reporter suggests, be advisable to cut off half the arc lamps at eleven p.m., or all of them, replacing them by incandescent lamps on the same posts till dawn; and at first he only advocates street lighting in the central area. The figures for the central scheme are: Capital cost for 20 miles of streets, low tension, underground mains—10,000 private lamps of 8-candle power, 80 arc lamps, and 350 incandescents for public lighting—with high-speed plant, £57,417, and with low-speed plant £59,817, exclusive of legal expenses and professional charges. The estimated income is placed at £10,620; and the expenditure at £5770—leaving a balance to pay interest, sinking fund, rent, rates, taxes, insurance, &c., of £4850. For the external district the estimate is 1000 8-candle power private lamps, and 550 street-lamps of 32-candle power. The tables of estimated income are made up on the assumption that the whole of the lamps provided for are connected up with the mains, which, of course, would not be the case for some time after the installation starts work—how long (Mr. Burstall sagely remarks) will depend on the way in which the light is taken up by the inhabitants, which again would very largely depend on the price charged per unit. For the whole district, central and external, the estimate is: With high-speed plant, £104,020; with low-speed plant, £109,520. The total annual expenditure for the whole district is placed at £9166; and the estimated annual income at £20,280—leaving a balance of £10,664. The capital cost of the scheme for the central district alone is above the amount which the Gas Company have asked the Municipality for their property. If they have not already come to a decision on the matter, the Municipality will be well advised to look carefully before they leap. The question for them to consider is, whether it is wise to spend such a large amount of capital on what is nothing more or less than a speculative venture, when a smaller expenditure will secure an established business, with an assured income.

Reduction in Price.—The West Stanley Gas Company have decided to make an immediate reduction in the price of gas from 3s. 3d. to 3s. per 1000 cubic feet. It is also intended to allow 25 feet per penny, instead of 23 feet, to consumers using slot meters.

Hull Corporation Gas Supply.—The gas consumption in the area of supply of the Hull Corporation continues to increase in a very satisfactory manner; and there is every probability that all the hopes of Alderman Massey in connection with the purchase of the gas-works will come to pass. Replying to a vote of thanks at the meeting of the Gas Committee (of which he is Chairman) yesterday week, he said his object now was to bring down the price of gas to the figure stated when they took over the works, which would mean a further reduction of 2d. per 1000 cubic feet. The repayment of the cost of the undertaking would work out automatically, with a reduction for the time of 4d. per 1000 cubic feet in the price of gas; and in due course the public would have a valuable site, by the dismantling of the works, for the enlargement of the Town Hall or for street improvement, without any cost to the ratepayers.

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NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It is with a feeling of the utmost gratification that I note the thorough success which has attended the working of the Peebles gas undertaking in the first year of possession by the Corporation, The accounts were laid before the Gas Commissioners on Monday, by Mr. W. H. Williamson, the Treasurer to the Commissioners. Provost Ballantyne explained that they should have been submitted in July, but that owing to the complete change in the system of book-keeping and stating the accounts, rendered necessary by the Gas Act, and to other causes, it had been found impossible to do so until now. The cost of manufacture and distribution of gas, and of managing the undertaking was £1967; and they had to add to this the annuities payable to the shareholders of the Company, amounting to £580—making the total expenditure £2547. The revenue from gas amounted to £2153, from residuals £257, from interest £53, and from rent £18—together £2481. There was thus an apparent loss of £66. But it was only apparent, because the accounts, in terms of the statute, were closed as at May 15, which was earlier than the Company closed them; and it had been found impossible to include the May survey in the accounts. There were thus only the collections following the November and February surveys in the revenue dealt with. The three surveys would be included in the accounts for the current and subsequent years. Had the May survey been dealt with, the revenue from gas would have been £2775, and the total revenue £3106; so that there would have been a surplus of £559. On the year's working, leaving the annuities out of account, there would have been a surplus of £1139. The sale of gas during the year amounted to 13,319,500 cubic feet—an increase of 855,300 cubic feet upon the preceding year. They had to bear in mind that very few cookers were fixed before May, so that the increase stated was almost entirely for lighting. There were now 410 cookers and 110 grillers fixed; and the consumption of gas in the period between May 15 and Sept. 30 had been 5,300,000 cubic feet—an increase of 2,100,000 cubic feet over the corresponding period of last year, or equal to an increase of 66 per cent. The whole of the cookers and grillers had been supplied by Messrs. Fletcher, Russell, and Co., Limited; and, thanks to the untiring energy of Mr. Bell, their Manager, they had all been fitted up in five months. As the total number of their consumers was 950, it would be seen that more than half of them had taken cookers or grillers. The introduction of these had been an unparalleled success; no town in the United Kingdom having hitherto at all approached them in the proportion of cookers to consumers. Every cooker had a slot meter attached; and at the August slot-meter survey the sum of £243 was taken from them. They had been able to make this extensive purchase of cookers on account of their having received from the Gas Company cash to the amount of £3600. This money had formerly been partly lent to the North British Railway Company, and yielded £48 a year of interest. They calculated that in rents of gas-cookers alone they would have a revenue of £68 a year, which showed the profitable nature of the transaction. The cost of the transfer had not been ascertained yet; but it would be soon. He thought they might congratulate themselves upon the success of the undertaking so far. The accounts were unanimously adopted.

At Falkirk, the increase in the consumption of gas has been so great that the Works Committee were called together on the 4th inst. to consider the situation. During September, the increase amounted to 1,042,300 cubic feet. The question was as to whether it would be necessary to provide more retort-power in the works. The Committee decided not to do so in the meantime; being of opinion that they will be able to pull through with the retorts they have. But the consumption is to be watched; and if it goes on increasing as it has done, it is believed that it will be necessary to add to the number of retorts. The coal storage in the works is very inadequate; it being frequently necessary to put wet coal into the retorts. To avoid this, additional storage accommodation is being looked out for.

The Corporation of Glasgow are this year receiving for residual products prices which, it is estimated, will realize £30,000 more than last year. This will about counterbalance the extra cost of coal, which, upon 650,000 tons contracted for, at an average of 1s. per ton advance upon last year, amounts to £32,500.

The gas stokers in the employment of the Corporation of Dundee have begun an agitation for the increase of their wages from 7d. to 8d. per hour, and for overtime. Yesterday afternoon a deputation of the men had an interview with the Engineer and Manager (Mr. W. M'Crae). Mr. M'Crae is stated to have told the men that they were much better off than the stokers in many gas-works, and that the present was not a suitable time for applying for an increase; but that if they wished to press the matter, they could petition the Town Council through him. As to overtime, Mr. M'Crae said he was not in favour of paying for overtime to any man unless the employee for whom that man worked gave notice of his inability to commence work six hours previous to starting time. The men have agreed to draw up a petition for the increase, and for payment at the rate of time-and-half for overtime. Mr. M'Crae's views have thus not been adopted upon either point. He could scarcely have expected that they would be. The men are not making their requests because they have discovered that their pay is inadequate, but because they are being pushed on from behind by the Union, who are at present campaigning in Scotland. No considerations as to the suitability of the time will ever have weight with the aristocracy of the Gas Workers' and General Labourers' Union; neither will any considerations as to local circumstances. In Dundee, for instance, twenty shillings will go a good deal further in providing lodging and maintenance than it will in such places as Glasgow or Edinburgh; yet the men will not be allowed to take this into account. If 8d. an hour is paid in any works, it must also be paid in Dundee, as well as in other works at whose doors the Union will be knocking presently.

There is another consideration which must, at the present time, weigh with all to whom application is made for an increase of wages—that is, the existence of an extraordinary scarcity of workpeople, both skilled and unskilled. I know of several works which are being seriously hampered for want of men, though every effort is being made to secure them.

GAS-FIRE SEASON 1899-1900.

13 NEW PATTERNS IN **26** SIZES AND **39** FINISHES.

FIRES:—

	SIZES.	FINISHES.
"WOOD FIRES"	11	11
"LORD OF THE ISLES"	1	2
"SHAMROCK"	2	6
"IMPROVED VIVID"	1	1
"WAVERLEY"	1	1
"RALEIGH"	1	2

WHITE LIGHT STOVES:—

"PYRAMID"	2	2
"RUTLAND"	1	3
"CORRIDOR"	2	2
"RAJAH"	1	2
"REGENT"	1	3
"ROBIN HOOD"	1	3

GREENHOUSE BOILER:—

"SNOWDROP"	1	1

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Where have they all gone to? The scarcity existed before the war broke out, and is therefore not caused by it, though this will undoubtedly accentuate the situation. The question is one for political economists or sociologists to apply their minds to. I have looked around, and can find no explanation which is satisfactory to myself for the existing state of matters; and I therefore venture upon none. It is sufficient to point it out. Its seriousness consists of the fact that the season is approaching when gas managers will be taking on their winter hands; and they may have trouble in finding them.

The Edinburgh Dock, at Leith, has been fitted up with an installation of incandescent gas lighting, upon the intensified system introduced by the Messrs. Sugg. The installation is an experimental one, for the purpose of comparison with the electric light, which is employed in the Victoria and Old Docks. On Thursday night, the Commissioners visited the docks and inspected the installation. They were thoroughly satisfied with the light; the only questions which remained to be determined being the cost and whether the system is robust enough for dock lighting.

The Newport (Fife) Gaslight Company held their annual meeting last Saturday. It was reported that the balance of profit for the year amounted to £629. A dividend at the rate of 3 per cent. was declared, and a balance of £260 was carried forward. It was resolved to convert the undertaking into a limited liability Company, with a view to afterwards applying for powers to supply electric light.

North Berwick is a favourite autumn haunt of some of the minor Royalties, and is the darling recreation ground of Mr. A. J. Balfour. Its popularity is growing; and the prevailing local sentiment is that, towards this end, its amenity must be protected. The gas-works are too small for the consumption. There is no room for extension of them; and they are, besides, awkwardly situated—being the first thing which strikes the eye of a visitor on leaving the railway station. It has been resolved to remove them to a new site. In the selection of this site Mr. J. M'Gilchrist, of Dumbarton, was consulted; and his report was to the effect that, after considering two which were put before him—one at Dirleton, and the other at Williamstone—he preferred the latter. At this month's meeting of the Gas Commissioners, doubt was expressed whether Mr. M'Gilchrist had taken anything into account except cost. The fear is that at Williamstone houses of a superior description may be erected, and that, in removing the gas-works on the score of amenity, they may plant them down in a place where they will later on be again an eyesore. It has consequently been remitted to the Gas Committee to ascertain the difference in cost between the two sites, and to look into other matters, with powers to again consult Mr. M'Gilchrist.

Mr. Henry O'Connor has begun his winter course of instruction in gas making, in the Heriot-Watt College, Edinburgh. It is a great privilege to students of gas manufacture to have the opportunity of receiving instruction in the subject from so distinguished a teacher. That the privilege is appreciated, is shown by the fact that one student comes to the class all the way from Leven, in Fifeshire, and is obliged to stay in Edinburgh overnight on class nights. Several others are receiving instruction from Mr. O'Connor by correspondence. The Heriot-Watt is a technical college. It is doing excellent work.

The bald statement is made that the Cowdenbeath Gas Company have resolved to continue to supply oil gas, and have arranged to introduce a new oil, which will enable them to reduce the price of the gas.

A prosecution took place in the Northern Police Court in Glasgow yesterday of a firm of cycle accessory agents, who were charged with having kept 19 lbs. of carbide of calcium without having obtained a license from the Magistrates entitling them to do so. The charge was admitted. An officer stated that the conditions of storage were unsatisfactory. A fine of £2 2s. was imposed.

In a report presented this week to the Electric Lighting Committee of the Edinburgh Town Council, signed by Professor Kennedy, the Consulting Engineer, and by Mr. Newington, the Resident Engineer, it is reported that the original station at Dewar Place is now as full of plant as it can be, and that the new station at M'Donald Road is ready to start two dynamos. The two stations will together be able to supply all the electric current that will be required in the coming winter. It is pointed out that the number of lamps (8-candle power, at 230 volts) has risen, since this time two years ago, from 109,000 to 245,000.

There is to be a sort of scramble for water for the supply of the eastern portion of Stirlingshire. Already a large part of the district is supplied by the Falkirk and Larbert Water Trust. This body find that the demand upon them is growing so fast that they are obliged to extend their works. It is proposed to take an additional gathering ground, and to increase the storage capacity by the construction of a new reservoir in the hills above Denny. In the meantime, however, all that is to be undertaken is the construction of the reservoir; and the Trustees are to meet on Tuesday next for the appointment of an Engineer for the scheme. But outside the compulsory area of the Falkirk and Larbert Water Trust, there is a large district for the supply of water to which the County Council are responsible. They have been making inquiries; and, on the advice of Messrs. Warren and Stuart, of Glasgow (with Mr. Watson, of Bradford, as Consulting Engineer), they have selected a separate drainage area in the same district as that from which the Water Trust derive their supply. The proposal is to construct a large intercepting reservoir, for both supply and compensation, having a capacity of 120 million gallons. The cost of the scheme is estimated at £59,000. The Eastern District Committee of the County Council this week agreed to form the district into a special water supply district, and to take the necessary measures for proceeding with the matter. Both the Water Trust and the County Council will, therefore, be in Parliament next session asking powers for water supply. The two schemes do not overlap; but there are conflicting interests at some points, which may be arranged, or which may on the other hand give trouble.

The St. James Illuminating Company, Limited, was registered on the 5th inst., with a capital of £2000, "to carry on the general business of gas engineers, manufacturers of, and dealers in, all kinds of apparatus for increasing the lighting or heating power of gas, oil, or other illuminants, as engineers and metal founders, electricians, and electrical engineers, and to acquire and turn to account lands and estates, real and personal property, patents, patent rights, &c."

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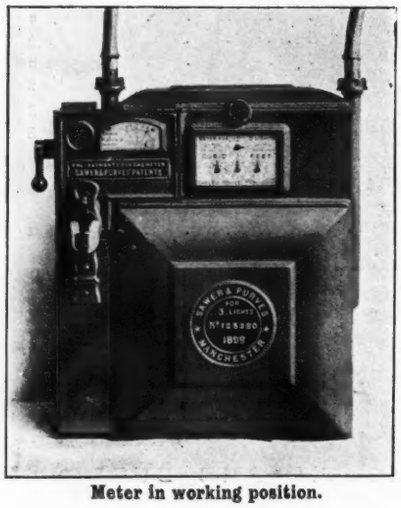

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 14.

Sulphate of Ammonia.—There is still no break in the downward movement; the closing quotations being £11 5s. per ton, f.o.b. Hull, and £11 7s. 6d. per ton f.o.b. Leith and Liverpool. There has been more business doing; but production is increasing, and is being removed as ready. London has been the weakest point; and orders have been placed there which usually have been filled elsewhere. This has had the effect of depreciating prices at other points. Shipments during September have been upwards of 1000 tons in excess of those for September, 1898; so that no stock can have accumulated during the month, notwithstanding the very quiet appearance of the market. In the forward position, October-March is reported to have been done in Scotland at £11 7s. 6d. per ton; but at the close this price is hardly obtainable. For January-June delivery, buyers ideas are below £11 7s. 6d. per ton.

Nitrate of Soda.—Owing to an advance of the f.o.b. price of nitrate of soda on the west coast of about 3d. per quintal, values have improved in all positions; and spot quotations are 7s. 7½d. per cwt. for good, and 7s. 10½d. per cwt. for refined, quality.

LONDON, *Oct.* 14.

Tar Products.—Pitch is said to be weaker, owing, it is alleged, to the higher freights being demanded for shipment. The statement is remarkable since the last few days have shown a marked advance in the value of coal and all kinds of fuel. Perhaps the wish is father to the thought. It is quite certain, however, that distillers have paid such a price for their tar that they cannot afford to accept a less value than has been recently quoted for the pitch they produce. A fairly good market continues in benzol and the other light tar products, particularly naphthas. Heavy products, however, are not lively, excepting perhaps carbolic acid, which is now commanding a somewhat higher price than has prevailed for a year or two. No interest attaches to anthracene, which still continues to be a drug; lower qualities being offered at prices that would better pay the producer to leave it in the oils.

The average values obtaining during the week are: Tar, 16s. 6d. to 25s. 6d. Pitch, east coast 33s. to 34s., west coast 32s. Benzol, 90's. 9d.; 50's. 10d. Toluol, 90 per cent. 1s. 3d.; pure 2s. Solvent naphtha, 1s. 3d. Heavy naphtha, 1s. 2d. Crude, 30 per cent., naphtha, 4⅜d. Creosote, 3½d. Heavy oils, 70s. Carbolic acid, 60's. 2s. 2d.; 75's. 2s. 8d. Creosote, 55s. Anthracene, nominal, "A" 3½d.; "B" 2½d.

Sulphate of Ammonia.—This market is quite demoralized; and sellers have lent themselves to machinations of operators. The result is that values generally are weaker; and, according to position and conditions of shipment, they range from £11 2s. 6d. to £11 6s. 3d., less 3½ per cent., all ports U.K.

About 150 applications have been made for the position of Manager of the Teignmouth Gas-Works. A special meeting of the District Council was summoned for yesterday to consider them.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The position throughout the coal trade here remains practically without any material change from last week. Collieries have barely yet got clear of deliveries which had fallen into arrear, after the extra rush of buying prior to the advance in prices; and with the steady weight of new business coming forward on all descriptions of fuel, pits have been more than kept fully going. The better qualities for house-fire purposes are in fairly good request. Other descriptions continue in quite as brisk demand as ever; and notwithstanding the increased quantity of slack that has been produced, owing to the extra screening for house-fire purposes, it is only in very isolated cases that collieries have supplies at all in excess of requirements. Prices all round are exceedingly firm at the full advance; averaging 12s. 6d. to 13s. 6d. per ton at the pit for best Wigan Arley, 11s. to 11s. 6d. for Pemberton four-feet and seconds Arley, 10s. 6d. for common house coal, 10s. for steam and forge coal, 7s. to 7s. 6d. for best engine fuel, 6s. to 6s. 6d. for medium, and 5s. 6d. for common slack. Shipping is tolerably brisk, with lessened supplies offering for this trade owing to the pressing inland requirements; and prices have shown a decided hardening tendency. Ordinary steam coal averages 10s. 6d. to 11s. per ton at the Mersey ports, with house-fire descriptions fetching 12s. 6d. to 13s. 6d. Coke continues in pressing demand, with prices, although not officially advanced, tending upwards. Furnace qualities are fetching 18s. to 20s. per ton at the ovens, and best foundry cokes 26s. to 27s. It may be added that the wages question is rapidly coming to the front in the coal trade. The Miners' Federation are unanimous in favour of asking a further 5 per cent. advance directly the conditions of the wages settlement allow notices for this to be sent in. It is probable that the matter will not be left over until the usual general conference of the Federation, but will be dealt with as early as possible.

Northern Coal Trade.—There has been a rather better demand for coals of all classes in the last few days; and the collieries in the North have been active in endeavours to meet the needs. In regard to steam coals, the arrivals of delayed steamers for cargoes is partly the cause; but for the gas coal trade, the chief factor is the enlarging consumption week by week. Best Northumbrian steam coals are quoted at from 10s. 6d. to 11s. per ton f.o.b., second-class steam 10s., and steam smalls 6s. 9d. to 7s. Manufacturing coals are steady; and there is rather a difficulty in procuring additional supplies. In the gas coal trade, there is little doing in new contracts; but the deliveries on the older arrangements are increasing, and the collieries are taxed to meet the requirements. Prices quoted for best Durham gas coals are 10s. 6d. to 11s. per ton f.o.b. for occasional cargoes; and an attempt is being made to obtain the former rate for contracts for export over next year. Gas coke is about 13s. to 13s. 6d. per ton f.o.b.

Scotch Coal Trade.—There is little outward change; demand and prices being much about the same as last week. Home consumption is the leading line; there being a serious falling off in the demand for export purposes. In Fifeshire, some of the pits are working short hours, on

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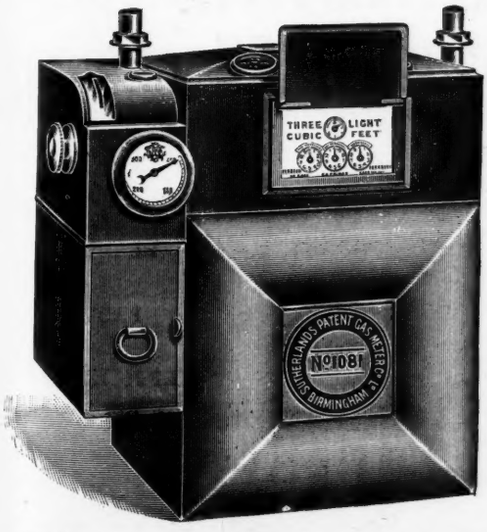

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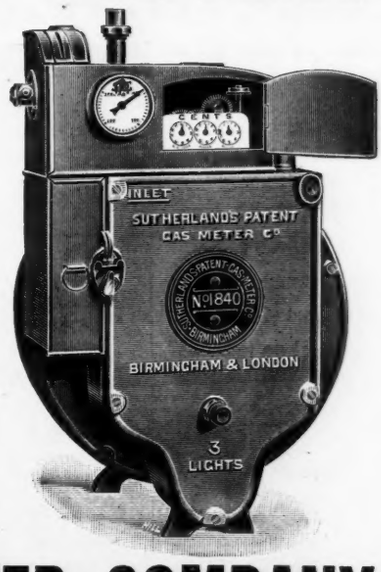

THE SUTHERLAND GAS-METER COMPANY
ESSEX WORKS, BIRMINGHAM.

account of the decrease in shipping business. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 9s. 9d. to 10s. 6d. and splint 10s. 3d. to 10s. 6d. The shipments for the week amounted to 144,483 tons—a decrease of 43,702 tons upon the preceding week, and of 53,855 tons upon the corresponding week of last year. For the year to date, the total shipments have been 6,783,567 tons—a decrease of 891,163 tons upon the same period of last year.

The Extensions at the Barmouth Water-Works.—Last Tuesday, a special meeting of the Barmouth Urban District Council was held to consider the advisability of applying for a Provisional Order to pay £5000, a sum over and above the borrowing powers of the Council, spent on the new water-works. The borrowing powers of the Council amount to £25,000; and the water-works have cost nearly £30,000. Arrangements to obtain an Order were made.

The Geltsdale Water Scheme for Carlisle.—Mr. E. M. Eaton has examined the plans and sections relating to the upper portion of the new water scheme of the Carlisle Corporation in Geltsdale, submitted to him by Mr. C B. Newton, the Borough Gas and Water Engineer. Mr. Eaton says he has much pleasure in generally approving of the whole of the arrangements, which Mr. Newton has laid down in a very excellent manner, and in recommending that he be authorized to proceed with the practical carrying into effect of the designs.

Acetylene Gas Explosion.—Mr. B. Alexander, the Manager of the Photographic Tile Works, of Hatton, near Burton-on-Trent, was endeavouring, on Sunday of last week, to find a defect in an acetylene generating apparatus; and his investigation ended in his death. It is surmised that he unwittingly leant over the generator with a lighted cigarette in his mouth, and so induced an explosion. The front part of the unfortunate gentleman's head was completely battered in. Medical aid was at once summoned; but the sufferer died on Monday morning.

Swansea Gas Company.—The half-yearly meeting of this Company was held last Friday week, when it was reported that, notwithstanding the fine weather during the last five months, the consumption of gas had increased 10½ per cent., as compared with June, 1898; and during the last three months the increase had been at the rate of nearly 14 per cent. This was attributable to the coin-meter system, which had increased during the last twelve months by 2195; and of these 1089 customers had gas-cooking stoves. This had entailed a large outlay of capital; £13,000 having been spent during the twelve months. The capital raised by the recent auction sale realized a very satisfactory price; the new ordinary stock selling at £120 10s. 10d. per cent., and the 3½ per cent. at £101 3s. 4d. The latter would give the purchaser interest equal to £4 3s. per cent. The accounts submitted were satisfactory. The profits would enable the full statutory dividend being paid and a balance carried forward to the next half year. The purifiers and other new works in course of erection would be completed during the present month. The report and accounts were adopted; and votes of thanks were passed to the Directors, Auditors, and Engineer of the Company, Mr. Thornton Andrews.

Douglas (Isle of Man) Gas-Works Purchase Question.—The Douglas Town Council met last Wednesday, when Alderman Procter moved that a Committee be appointed to consider the advisability of the Council negotiating for the purchase by the Corporation of the Douglas Gas-Works. The motion met with strong opposition; and, on being put to the vote, it was lost.

Contemplated Water-Supply Improvements at Rhyl.—At the meeting of the Rhyl District Council last Tuesday, the question of obtaining parliamentary powers to enable the construction of an additional storage reservoir at Llannafydd was considered. It was calculated that the new works would cost at least £15,000 to £20,000. A discussion also took place on the question of applying for powers of absolute control over the watershed. It was decided by a large majority to take the necessary steps to secure powers for these purposes.

The Royal Commission (London Water Supply) Report.—The non-appearance of the report of the Royal Commission on the London Water Supply is causing many inquiries in various quarters; and so far nothing can be learned definitely as to when the document may be expected. The "Daily Chronicle" last Friday asks: "What has become of the report of the Royal Commission on London Water Supply? The Commission was expected to report before the last County Council election. Then it prolonged its proceedings; but the report was looked for in time for the opening of Parliament last year. There was more delay; but finally the evidence was finished early this year, and it has been stated that Lord Llandaff and his colleagues were considering their report. The public are beginning to forget that such a Commission was ever appointed; and the Commissioners may have lost sight of the fact that a report is expected from them before the end of the century. It looks as if it were intended at least to keep it back until after the County Council has formulated its legislative schemes for the coming session."

The Revival of the Gas-Works Question at Leamington.—The gas-works purchase question is likely to again engage attention at Leamington; but it does not promise to have the issue desired by the votaries of municipalization. For the meeting of the Town Council yesterday week, Alderman Wackrill had given notice that, in accordance with the powers conferred by the Corporation Act of 1896, the Council should require the Gas Company to sell their undertaking. Since, however, placing this proposal on the paper, the Alderman had been informed that it was necessary to rescind, after notice, a former resolution before his proposition could be put; and the Mayor and the Clerk gave it as their opinion that this was so. In consequence, Alderman Wackrill moved, and Mr. Richards seconded, the suspension of the standing order governing the matter. Alderman Bright opposed this, and remarked that he did not see that the circumstances had altered since the passing of the resolution on Sept. 13, 1897—viz., "That after hearing the report of Mr. Newbigging, this Committee does not recommend the Council to proceed further with the project of buying the gas-works." On the motion for suspension being put to the meeting, only ten members voted in its favour; the requisite number being seventeen. Alderman Wackrill said he would supply the Mayor with information to enable him to call a special meeting to deal with the question.

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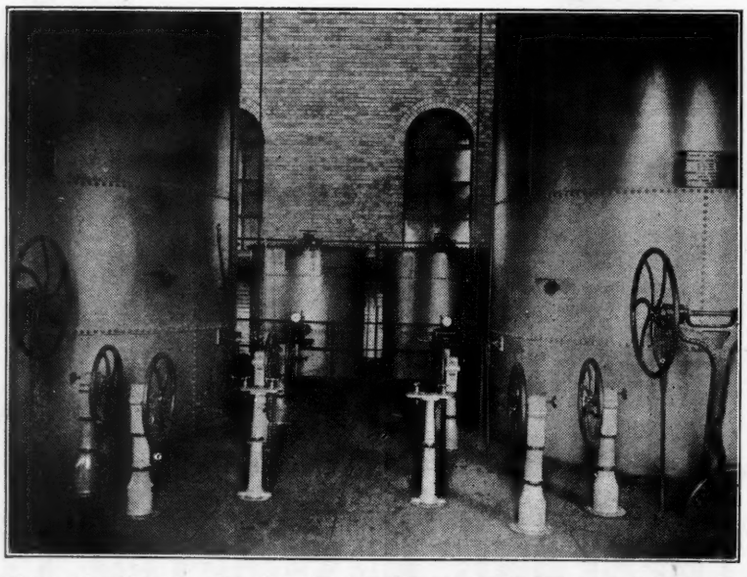

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A Water Scheme for Wyvenhoe.—The Local Government Board have intimated to the Wyvenhoe District Council that they are not prepared to grant them permission to borrow £5450 for a scheme of water supply until the result of boring has been ascertained. They are, however, willing to grant, on certain terms, a loan for the cost of boring.

New System of Automatic Church Lighting.—A complete revolution in public gas lighting has recently been put in practical form at St. Nathanael's Church, Bristol, the second church in England which has adopted Bartlett's patent automatic igniter for controlling the lights. As carried out at St. Nathanael's, the system consists of 50 incandescent gas-burners, fitted with patent igniters, enabling the whole or any number of the lights to be operated from a given point without disturbing the congregation. The lights may be raised and lowered at will, in the same manner as switching on and off an electric lamp. The old system of lighting the church consisted of 272 burners, consuming about 800 cubic feet of gas per hour; while the new system consists of 50 No. 4 new Welsbach burners, consuming 250 cubic feet per hour. The cost of gas under the old system was 2s. per hour; under the new 7d.—the light being increased four-fold. The needful fittings were supplied by Messrs. John Russell and Co., Limited.

Crediton District Council and the Gas-Works.—The negotiations for the purchase of the local gas-works by the Crediton District Council have been broken off. Some time ago the Council wrote to the Gas Company asking if they were prepared to sell the works to the Council; and, if so, at what price. To this communication, the Directors replied, on July 10, to the effect that they would consider an application for the purchase of the undertaking on condition that the Council would agree to bear the cost of a valuation by a competent gas engineer to be mutually agreed upon. No answer was returned to this; and the Company wrote again asking for a reply, and stating that, if a satisfactory answer was given, a meeting of the shareholders should at once be called. This letter was read at a meeting of the Council last Tuesday. The Rev. J. Tucker, a member of the Council, said he had had an interview with the Secretary of the Gas Company, in which he did not hesitate to tell him that the Company had not treated the Council with due respect, and that their method of procedure was most unbusiness-like and stupid. The Council asked if the Company were prepared to sell the works, and the price they would require; and the only answer was a letter asking them to pay for the valuing of the works, without even telling them whether they were prepared to sell afterwards. If they did not know how to consult their own shareholders, he wished they had Directors with some business tact. Mr. Dart said his answer to Mr. Tucker was that the Company were prepared to sell at a fair and reasonable price. After some further talk, it was suggested that the Council take no further steps in the matter; and this was agreed to. Some letters were afterwards read, offering the Council water rights and water with a view to the establishment of electric lighting works. Mr. Tucker thereupon said he should like to know the feeling of the Directors of the Gas Company with regard to the sale of their property. He did not think it would be to have electric light and gas undertakings in a small town like Crediton. It was decided to make inquiries as to the water power.

The Assessment of the Brighouse Gas-Works.—The Town Clerk and Gas Engineer of Brighouse (Mr. James Parkinson) attended before the Assessment Committee of the Halifax Board of Guardians last Saturday week, and appealed against the new rate valuation of the Brighouse and Rastrick Gas-Works, which has been increased by £1200. The appeal was refused. The amount due from the Corporation was paid under protest, with a view to a re-valuation next year.

Extensions at the Leek Gas-Works.—At Friday's meeting of the Leek Urban District Council, the main business before the members was to consider the proposed expenditure of about £22,000 in extending, improving, and modernizing the plant at the gas-works, which is incapable at the present time of supplying Leek with such an amount of gas as is now required, or will be needed in the immediate future. The Gas Committee had met, and the reports of Mr. Thomas Newbigging were considered; and it was recommended that the tenders of Messrs. W. J. Jenkins & Co., Limited, be accepted for Sections 1 and 2, and that of Messrs. C. W. Walker, Limited, for Section 3, reserving the tender for the conveyor until certain outside arrangements can be made. The alterations proposed to be carried out will cost about £22,000.

The Gas and Water Supply of Newtown, Montgomeryshire.—Last Thursday, at the meeting of the Newtown Urban District Council, the Gas Committee recommended that a short statement respecting the proposed purchase of the gas-works should be prepared and submitted to the owners and ratepayers, with a request to send their replies to the Council. If there were a majority in favour of the purchase of the works, the Council would have no hesitation in carrying out their wishes. The recommendation was carried by five votes to three. The Water Committee reported that arrangements had been completed whereby a loan for the purchase of the undertaking of the Water Company, the payment of the costs of the Act and arbitration, and the costs of the improvements in the works, would be completed within a short period—the Public Works Loan Board having agreed to make the advance at 3½ per cent.

Sale of Shares.—At the Mart last Tuesday, Mr. Alfred Richards sold a variety of gas stock and shares at good prices, having regard to the prevailing state of the money market. In the Sutton Gas Company, £10 fully-paid original shares realized £22 and £22 15s., £10 fully-paid additional shares £15 10s. and £16 10s., £10 additional shares (£2 paid) £4 5s., and a £100 4 per cent. mortgage debenture changed possession at par. In the Reigate Gas Company £290 of consolidated stock yielded £307 10s. per cent., which is an excellent price for a non-statutory concern. A new issue of £5000 of ordinary stock in the Plymouth and Stonehouse Gas Company was offered; but only three lots of £100 were sold at £145 each—the rest being withdrawn. In the North Middlesex Gas Company, fifty £10 ordinary shares were disposed of at £16 5s. each; but other lots did not find purchasers. In the Newhaven Gas Company, 74 £10 fully-paid shares produced £20 15s. apiece. In the Tottenham and Edmonton Gas Company, £950 of consolidated "A" stock fetched £145 and £142 10s. per cent., and £600 of consolidated "B" stock £106 and £105 per cent. The prices obtained for the last-named stocks were above the market quotations for the day.

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Makers of Holgate's Patent Gas-Purifying Plant.
Makers of Tysoe's Patent Self-Sealing Mouthpiece.

Further Gas-Works Extensions at Manchester.—The Gas Committee of the Manchester Corporation at their meeting last Friday decided to recommend the City Council to apply to the Local Government Board for their sanction to the borrowing of £250,000 for gas-works extensions, out of the sum of £500,000 which the Council had already obtained power to borrow for the purpose.

Sea Water for Roads.—In an article on "The Local Government of Cape Town" in a recent number of the "Municipal Journal," reference is made to the scheme introduced by the Corporation for supplying the city with sea water, which it appears has proved of great value for street watering, fire extinction, &c. Both salt and fresh water have been employed at times for the first-named purpose; and the result of comparisons has been in favour of the use of salt water. It is found that it requires fully three waterings with fresh water to equal the effect of one with salt water, as, owing to the deliquescent nature of the salts, the road remains moist for a much longer period than when it is sprinkled with fresh water, and a skin or crust is formed on the surface which tends to prevent the roads from drying and the dust from rising rapidly. There is a report that the sea-water scheme for London is to be revived.

The West Riding County Council and the Derwent Valley Water Act.—At the meeting of the West Riding County Council last Wednesday, the Law and Parliamentary Committee presented a report in which they pointed out the advantages the Council had gained by the Derwent Valley Water Act of the past session. In the course of the report they said: "The Act generally marks an advance in the recognition of County Councils as having practical interests in water supplies, and affords justification for the action originated, but not always sustained, by the County Council for the proper distribution and protection of water. Among the clauses of the Act are several which the Council was the first to obtain, including the following: (1) The compensation water to be discharged in a continuous flow throughout the day; (2) penalty, in case of default in sending down the compensation, recoverable by County Councils of Derbyshire and Nottinghamshire; (3) compensation water-gauges to be open to the inspection of any officer of the County Council of Derbyshire; (4) prevention of plumbism; (5) for preserving the right of the Derbyshire County Council to divert main roads and alter or remove county bridges in which water mains or conduits are laid—all following closely the lines of the West Riding clauses. . . . Among the more novel provisions are power to the Derbyshire County Council, with the approval of the Local Government Board, to constitute water districts, and appoint Water Committees for the taking and distribution of water; power for the Joint Water Authority to maintain rain-gauges, and to report, by telegraph, to such authority as may wish to receive the information, the occurrence of unusually large rainfall and probability of coming floods, with power to Parish and District Councils and Corporations to contribute towards the cost, and publish the information; and express power to the County Council of Derbyshire to promote Bills in Parliament for water purposes. The Act is a distinct development of the movement for the more economical utilization of the sources of water supply."

A New Reservoir Wanted for Cardiff.—The Cardiff Corporation are, it is said, contemplating the necessity for an early addition to their already extensive storage accommodation at the water-works. Owing to the long drought during the past summer, the town was reduced to a store of 30 days' water supply; and some members of the Corporation are now considering the advisability of trying to obtain powers next year for the purpose of borrowing money to complete the water supply system, as originally planned. This would mean an increase in the rates; but it is absolutely necessary if the town continues to increase as it is doing at present.

The Value of the Divining-Rod in Searching for Water.—"Longmans' Magazine" contains an account of an experiment with the divining-rod which proved unsuccessful in finding water. It was tried at Upp Hall in 1894; and the following particulars in regard thereto are furnished: "A noted dowser was retained, and dowsed about the house. In the moat garden the twig tilted upwards so violently that it broke; indicating, so said the prophet, that a very strong spring existed near the surface. On the faith of his guarantee, a well was sunk; but when it had reached a depth of 60 feet, as no spring, either strong or weak, was met with, the pit was filled in again. This authenticated story is instructive, and suggests that the magical powers of dowsers are not beyond question."

St. Helens and the Water Supply of Rainford.—Colonel A. G. Durnford has recently considered an application by the St. Helens Town Council to the Local Government Board for sanction to borrow various sums for public improvements. Among the items was £2000 which was required in connection with the water supply of Rainford It was stated by the Town Clerk (Mr. G. W. Bailey) that it was proposed to expend the money in laying mains from the Corporation pumping-station at Eccleston Hill to a projected reservoir at Rainford. The limit of supply was 350,000 gallons per week. The Local Government Board had some knowledge of the matter, as they had already permitted the borrowing of £6000 by the Rainford Council for the construction of the reservoir and distributing-mains.

A Scheme of Water Supply for Kingsbridge.—A report by Messrs. John Taylor, Sons, and Santo Crimp on a scheme of water supply for Kingsbridge was submitted to the District Council last Wednesday week. They recommend a gravitation scheme. At Place Moor there is a suitable site for a reservoir. The watershed is 155 acres in extent, is mainly moorland, and has no buildings upon it. A storage reservoir with a capacity of 9 million gallons should be constructed at an altitude of 380 feet, and also a service reservoir of 90,000 gallons, or equal to two days' supply. The estimated cost of the scheme is £10,000, while an alternative scheme with a storage reservoir on the border of Dartmoor would cost £13,000. The best water would probably be obtained from Dartmoor; but the supply from Place Moor would be perfectly pure and uncontaminated, and because of its smaller cost the Engineers recommended this. The Council adopted the Place Moor scheme, and decided to take the necessary steps to obtain a Provisional Order to sanction its execution.

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28, BATH STREET.
Telegraphic Address: "GOTHIC."

BIRMINGHAM:
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Telegraphic Address: "GOTHIC."

MANCHESTER:
87, BLACKFRIARS STREET.
Telegraphic Address: "GOTHIC."

WINTER SEASON 1899-1900.

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Outside sizes 22 in. wide, 8 in. deep, 30 in. high.

PRICE (With Hand-Painted Tiles) £3 3s.

Complete Fire List may be had on application.

Winding-up of the Gomersal Water Company.—A meeting has been held to wind up the affairs of the Gomersal Water-Works Company, whose undertaking was recently transferred to the District Council. The Company was established in October, 1863, with a capital of £5000 in £5 shares; and it has always been successful as a commercial undertaking—having for six or seven years paid the maximum dividend of 10 per cent. The report of the Liquidator (Mr. John Shaw) showed that the sum received from the District Council—£8410, fixed by arbitration—was sufficient to allow the repayment of £9 12s. per share, which, with 15s. per share paid after the sale of the Birkenshaw mains, makes a total of £10 7s. per share.

Winding Up of the Newtown Water Company.—The shareholders of the Newtown Water Company have met for the purpose of receiving from the Chairman (Mr. Richard Lloyd) a statement as to the financial position on the purchase of the undertaking by the District Council. It appeared from his remarks that the sum paid by the Council was £27,616; and this made the total amount possessed by the Company £29,799. A payment of £18 per share to the proprietors had absorbed £21,600; and legal and other expenses, and £3000 to pay off debentures, made the total disbursements £29,424—the balance remaining being about £375. The Chairman lamented the large amount of money that had been wasted in legal and other costs, owing to the District Council not acceding to the request of the Directors to take over the concern on a valuation by two arbitrators. Before the meeting terminated, the shareholders agreed that an honorarium of 50 guineas should be handed to the Chairman in recognition of his services.

Saltash Water Supply.—A scheme for the improvement of the water supply has been laid before the Saltash Town Council, by Mr. E. Sandeman, the Water Engineer to the Plymouth Corporation. Saltash is supplied from the mains of the Plymouth Corporation by means of a 5-inch steel pipe passing under the River Tamar. Some interruptions of this supply, and the risk of it being entirely cut off for a comparatively long period, led to the Corporation consulting Mr. Sandeman. His advice was that a storage reservoir with a capacity of 500,000 gallons should be constructed at Saltash; that a 2-inch pipe should be laid under the Tamar as an alternative means of supply; and that the excess of pressure on the present main should be taken off by a pressure-reducing main. Since Mr. Sandeman reported, the Great Western Railway Company have consented to the alternative pipe being laid on the Royal Albert Bridge. Mr. Sandeman's proposals are, however, opposed by a party in the Council, who hold that it would be better and cheaper for the town to have an independent water supply.

Water Supply in the South Staffordshire Water Company's District.—A conference of representatives of Local Authorities to consider the question of the supply by the South Staffordshire Water Company during the past summer was held at Dudley last Wednesday. Delegates were present from about ten authorities. The Mayor of Dudley presided; and he asserted that the town and the neighbouring districts had suffered keenly in consequence of the recent drought. He held that a Company with the powers and a monopoly such as those possessed by the South Staffordshire Company should be prepared to meet all requirements made upon them in such a dry season as was experienced last July and August. So far as Dudley was concerned, there was no excuse for the state of things which had existed, as there was plenty of water available at the source upon which the town was dependent for its supply. He believed, however, that these conditions did not apply to some of the districts represented at the conference. At the annual meeting of the Company, it was stated that during the last six months they had pumped 184 million gallons of water into the district more than in the corresponding period of the previous year; but it was also admitted that during the same period they had laid on the water to 2280 additional houses, which, he presumed, would require the extra quantity pumped. Complaints were also made by speakers from West Bromwich, Halesowen, and Tipton. It was afterwards stated that at Burton-on-Trent a ratepayers' petition in reference to the inadequate supply of water had been sent to the Local Government Board, who would hold an inquiry with regard to the matter early in November. This showed very clearly that the Board had jurisdiction. On the proposition of the Mayor of West Bromwich, it was agreed that the Local Government Board should be requested to hold an inquiry into the insufficient supply of water for all purposes from time to time existing within the area served by the Company.

Messrs. Crossley Bros., Limited, have recently delivered to an English customer the largest double-cylinder gas-engine—550 indicated horse power—they have yet supplied.

The World Gas and Electric Syndicate, Limited, is the ambitious title of a small Company recently registered with a share capital of only £3000; its object being "to carry on the business of an electric light and power and gas company in all its branches."

Among recent contracts that have been secured by the Barrowfield Iron-Works Company, of Glasgow, may be mentioned the roofing of the retort-house and other work at Dundee, to the amount of some £9000; and a condenser—probably the largest in the world—and other apparatus for the Summerlee Iron-Works, at a figure approaching £15,000.

Messrs. W. C. Holmes and Co., of Huddersfield, have received an order for one of their patent "New" washer-scrubbers, to deal with 400,000 cubic feet of gas per day, for the Caterham Gas Company, and have also obtained second contracts at works where they have recently erected machines capable of dealing with a million and one-and-a-quarter million cubic feet a day.

In connection with the sale of shares in the Newcastle and Gateshead Gas Company, advertised in another column, some particulars have transpired which show the rapid advance in the use of gas on Tyneside in a decade. In 1888 the gas sold was 1358 million cubic feet, and in 1898 the quantity had risen to 2304 millions. Thus in ten years there was an advance of over 67 per cent.

Messrs. Richmond and Co., Limited, have been holding an exhibition of their domestic gas appliances at St. Helens, under the auspices of the Corporation Gas Committee. Each afternoon and evening, Miss Lillie Richmond has discoursed on, and given practical illustration of, the merits of cooking by gas-stoves. One evening was devoted to a competition among the girls attending the cookery classes at the Gamble Institute. The proceedings were presided over by Mr. S. Glover, the Corporation Gas Engineer; and Miss Richmond performed the function of judge. Two gold and two silver brooches were given to the successful competitors. It may be mentioned that at St. Helens no rent is charged for gas stoves or fires; and only a nominal charge is made for the materials used in fixing. This policy of the Gas Committee has had its reward.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

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O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

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"Volcanism, London."

SHEFFIELD CHEMICAL COMPANY, LIMITED.

BUYERS of Spent Oxide. Sellers of OXIDE OF IRON and SULPHURIC ACID.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see Oct. 8, p. 842.]

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
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JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
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Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
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Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

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BALE'S OXIDE OF IRON, of finest Quality. Summer delivery specially recommended for efficiency and economy.
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SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

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JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, or NEWTON GRANGE, NEWBATTLE, DALKEITH, SCOTLAND.

BENZOL, specially made for the Enrichment of Gas.
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NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
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For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

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SULPHURIC ACID for Sale.
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GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

ENRICH your Gas with cheap Benzol.
Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.
Apply to SADLER AND Co., MIDDLESBROUGH.

GAS TAR wanted.
BROTHERTON AND Co, Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GLOBE Chemical Works, Marple, near Manchester, Sell the most reliable and best OXIDE OF IRON for Purifying Gas. Purity and Quality guaranteed
Sellers of the best RETORT CEMENT. Best Price given for SPENT OXIDE.

IRON OXIDE (Bog Ore), best quality, for the Purification of Gas, containing up to 85 per cent. Hydrated Oxide of Iron, and absorbing while being used a high percentage of Blue.
S. BOWLEY AND SON, Wellington Works, Battersea Bridge, LONDON, S.W.

MELROSE CYCLES

SHOULD be bought by Gas and Water Officials. Ladies' No. 1, £10 10s.; No. 2, £8 10s. Gents' No. 1, £10; No. 2, £8. Highest Quality. Twelve Months' Guaranty. Sent on approval. Catalogue free. MELROSE CYCLE COMPANY, COVENTRY.

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JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
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Telegraphic Address: "SATURATORS, BOLTON."

ASSISTANT (300 million Works), Eleven Years' Experience, desires Engagement as MANAGER of Medium Sized Works, with or without Secretaryship, or as ASSISTANT in Large Works.
Address No. 3358, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an Engagement by the Advertiser, a GAS MANAGER, with extensive Home and Colonial experience, who will be disengaged in the early part of the month of October. Well up in all the details of modern Gas-Works Construction and its Management, and the most approved Appliances introduced to economize the production of Gas and extend its use. Practically acquainted with both American and German Carburetted Water-Gas Plant and its manipulation. A good Draughtsman and Accountant. Satisfactory References and Testimonials.
Address No. 3332, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, two good Stokers (Shovel Charging). Must be good Furnace Men. Wages 30s. per week.
Apply, with References, to THOS. E. SHADBOLT, Gas-Works, GRAYS.

FITTER and General Working Assistant to the Manager required by the Ware Gas Company. Wages commencing 26s. per week.
Apply, stating Age and Experience, with Testimonials, to the SECRETARY, Gas Company, Ware, HERTS.

WANTED, a competent Gas-Fitter, used to House and Gas-Stove Fitting. Wages 30s. per week of 57½ Hours (permanency).
Apply, by letter, enclosing Testimonials as to Character and Ability, to the MANAGER, Gas-Works, DORKING.

MANAGER wanted for Gas Engineering Works. Preference given to a Gentleman with good Chemical knowledge. Suitable Salary and Interest in Business will be given.
Apply, by letter, to No. 3361, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ARCHITECTURAL Draughtsman wanted at a Gas-Works. Must be neat and accurate in his Work, and able to take out Quantities correctly.
State (by letter) Age, Experience, and Salary, to No. 3360, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, a competent Gas- WORKS FITTER, able to do light Smith Work and repairs of Mains (Gas and Water). Permanent Work and good Wages to a steady and reliable Man. State Age and Experience.
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WANTED, at large Gas-Works 12 miles from London, a WORKS FITTER. Must be a good Mechanic, well acquainted with Retort-House Work, and willing to make himself useful. Good character indispensable. Permanent position, and good Wages.
Apply, by letter, to No. 3362, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good all-round Gas-Fitter. One brought up on a Gas-Works preferred. State Age and Wages required.
Apply to the MANAGER, Gas Offices, Nantwich, CHESHIRE.

MAIN AND SERVICE LAYER WANTED.

THE Chester United Gas Company have a vacancy for a MAIN and SERVICE LAYER (experienced). Wages 26s.
Apply, in own Handwriting, to Mr. J. C. BELTON, Engineer and Manager, Gas-Works, CHESTER.

WANTED, by the Reading Gas Com- pany, an experienced FOREMAN MAIN and SERVICE LAYER. Must be competent to control Workmen.
Apply, enclosing recent Testimonials, and stating Age, Experience, and Wages required, to the undersigned.
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REQUIRED, for a Gas-Works in the Isle of Wight, a LEADING STOKER. Must be thoroughly competent to take charge of the Retort-House, and must understand the working of Regenerative Furnaces, Engine, Exhauster, &c. Alternate fortnightly Night and Day Shifts. To a reliable Man constant employment. None but those fully qualified, steady, and reliable need apply.
Apply, by letter, stating Experience and giving References, to No. 3359, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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GAS ENGINEER.

THE Gas Committee require the Services of a thoroughly competent, practical, and experienced GAS ENGINEER at a Salary of £400 per annum, to take charge of a rapidly developing Gas-Works (200 million cubic feet made per annum).
Applications, in Candidates' own Handwriting, with full Particulars as to Age, Training, and Experience, accompanied by not less than Three *copy* Testimonials of recent date, endorsed "Gas Engineer," to be sent to me not later than Twelve o'clock noon, on Monday Oct. 23.
Canvassing either directly or indirectly will be considered a disqualification.
By order,
R. M. PRESCOTT,
Town Clerk.
Town Hall, Nelson,
Oct. 9, 1899.

IRON ROOF for Sale, 132 feet long by 53 ft. 4 in. Span, in first-class condition.
Apply to CLAYTON, SON, AND Co., LIMITED, Hunslet, LEEDS.

ENGINE and Exhausters, 20,000 and 30,000 cubic feet per hour, delivered immediately. Cheap to clear.
J. F. BLAKELEY, Thornhill, DEWSBURY.

CAST Tank, 31 feet diameter, 12 feet deep, £4 15s. per ton. Straps and Bolts included Five Years old.
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FOR SALE—Purifiers for Gas-Works, all complete, with Pipes and Taps, 7 ft. long by 3 ft. 6 in.
Apply to the CEFN MAWR AND RHOSYMEDRE GAS COMPANY, LIMITED, RUABON.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
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FOR SALE—A Gas Exhauster in good condition, with Two 8-inch Valves, made in 1889. Capable of passing 50,000 cubic feet per hour. Can be seen working at the Holmfirth Gas-Works.
Offers are invited for the above.
Further Particulars may be had from
HUBERT RUSSELL,
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Gas Company, Holmfirth, Yorks.

CORPORATION OF LEICESTER.

RETORTS AND FIRE-BRICKS.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply and delivery of RETORTS and FIRE-BRICKS.
Specification, Quantities, and Form of Tender can be obtained from the Engineer.
Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Retorts, &c.," to be delivered at these Offices not later than Eleven o'clock a.m., on Wednesday, the 25th of October, 1899.
The Committee do not bind themselves to accept the lowest or any Tender.
ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.
Offices: Milistone Lane,
Leicester, Oct. 12, 1899.

FENTON URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders to supply and deliver 100 Tons of CANNEL.
Analysis, Price, &c., to be sent to the Chairman, Gas-Works, Fenton, Staffordshire, on or before the 21st inst.
F. H. DARWIN,
Manager and Secretary.
Gas Offices, Fenton,
Oct. 13, 1899.

TO COLLIERY PROPRIETORS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for 25,000 Tons of GAS COAL to be delivered by the 30th of June, 1900.
Tenders (forms for which can be obtained on application) must be delivered to the undersigned by post, not later than the first post on Friday, the 20th inst.
The Directors do not bind themselves to accept the lowest or any Tender.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Oct. 6, 1899.

BOROUGH OF ROCHDALE.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the above Cor- poration invite TENDERS for the supply of 20,000 Gallons of 90 per cent. BENZOL, to be delivered at the Gas-Works in about equal weekly quantities between Nov. 1, 1899, and March 31, 1900.
Forms of Tender may be obtained on application to Mr. T. Banbury Ball, the Manager at the Gas-Works.
Tenders, endorsed "Benzol," must be sent in to me (on the form provided) not later than Noon, on Wednesday, Oct. 25, 1899.
By order,
JAMES LEACH.
Town Clerk.
Town Hall, Rochdale,
Oct. 14, 1899.

THE Directors of the Witham Gaslight and Coke Company, Limited, invite TENDERS for not exceeding 1000 Tons of screened GAS COAL, to be delivered at Witham Station between the 1st of January and the 31st of December, 1900, in such quantities and at such times as may be required.
The Coal must be freshly wrought, clean, and free from Pyrites and Bats.
Tenders must state the price per ton, and be sent to the undersigned on or before Friday, the 3rd of November.
The Directors do not bind themselves to accept the lowest or any Tender.
By order,
F. P. BAWTREE,
Secretary.
Witham, Essex,
Oct. 13, 1899.

COUNTY BOROUGH OF SALFORD.
(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the purchase of about 900 Tons of SPENT OXIDE.
Further Particulars and Form of Tender may be obtained from the Gas Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Spent Oxide," to be sent to me not later than Three p.m., on Thursday, Oct. 19, addressed to the Chairman of the Gas Committee, Town Hall, Salford.
By order,
L. C. EVANS,
Town Clerk (*pro tem.*).
Town Hall, Salford,
Oct. 12, 1899.

FIRE-CLAY GOODS.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for the supply of FIRE-CLAY GOODS (Retort Bricks, &c.) required at their Neepsend, Effingham Street, and Grimesthorpe Stations during the next Twelve Months.
Specifications and Forms of Tender may be had on application to the Company's Engineer, Mr. J. W. Morrison.
The Directors do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, marked "Tender for Fire-Clay Goods," must be delivered by post to the undersigned not later than the first post on Saturday, Nov. 4.
HANBURY THOMAS,
General Manager and Secretary.
Commercial Street, Sheffield,
Oct. 14, 1899.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE OF FIVE PER CENT. PREFERENCE STOCK.

NOTICE is Hereby Given, that the Directors have instructed Mr. ROBERT MACK, Auctioneer, to SELL BY AUCTION, at the Offices of the Company, Grainger Street West, Newcastle-upon-Tyne, on Wednesday, the 1st day of November, 1899, at Twelve o'clock noon precisely,
£28,500 OF THE NEWCASTLE-UPON-TYNE AND GATESHEAD GAS PREFERENCE STOCK,
Bearing a fixed Preferential Dividend of Five per Cent. per annum, being part of the moneys authorized to be raised by the Newcastle-upon-Tyne and Gateshead Gas Act, 1896, the Redheugh Bridge Act, 1896, and the various Acts therewith respectively incorporated.
For Conditions of Sale and Further Particulars, apply to the undersigned.
(Signed) THOS. WADDOM,
Secretary.
Gas Office, Newcastle-upon-Tyne,
Oct. 10, 1899.

IMPERIAL CONTINENTAL GAS ASSOCIATION.
(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 7th of November next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 30th of June, 1899, and the usual Ordinary Business of such Meeting transacted.

Notice is Hereby also Given, that the CAPITAL STOCK TRANSFER BOOKS WILL BE CLOSED from the 24th inst. to the 7th prox., both days inclusive.

The Dividend will be paid on the 14th of November.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
Oct. 16, 1899.

SALE OF NEWPORT (MON.) GAS SHARES.
(UNDER THE PROVISIONS OF THE COMPANY'S ACT, 1886.)

MR. THOMAS PARRY has received instructions from the Directors to SELL BY PUBLIC AUCTION, at the King's Head Hotel, Newport, Mon., on Wednesday, the 25th day of October, 1899, at Three o'clock in the Afternoon,

55 CLASS "C" SHARES OF £100,
in Lots of One Share each.

The Statutory Dividend is 7 Per Cent. per Annum.

Particulars and Conditions may be had on application to the AUCTIONEER, Albany Chambers. NEWPORT; or to Mr. EDWARD F. MARFLEET, Secretary, at the Offices of the Company, Newport, MON.

Dated Sept. 22, 1899.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS'S OFFICES, No. 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

ISSUE OF £5000 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Wednesday, Oct. 25, at Two o'clock, in Lots.

Particulars at the AUCTIONEER'S OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
GRAYS GAS COMPANY, LIMITED.

400 £10 SHARES.

MR. ALFRED RICHARDS will Sell BY AUCTION, on Wednesday, Oct. 25, at Two o'clock,

400 £10 "B" SHARES
in the above Undertaking.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS.

SOUTH-WEST SUBURBAN WATER COMPANY.
SIXTY £10 ORDINARY SHARES and 108 £10 FIVE PER CENT. PREFERENCE SHARES.

PORTSEA ISLAND GAS COMPANY.
SIX £50 FULLY-PAID "B" SHARES.

WEST HAM GAS COMPANY.
FIFTY £5 ORIGINAL SHARES.

TO BE SOLD BY AUCTION BY

MR. ALFRED RICHARDS, at the Mart, E.C., on Wednesday, Oct. 25, at Two o'clock.

Particulars of the AUCTIONEER as above.

By order of the Directors of the
WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £7500 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 7, at Two o'clock, in Lots,

£7500 OF NEW ORDINARY STOCK
in the above Undertaking,

Ranking for a Standard Dividend of 7 per cent., subject to the Sliding-Scale; the last Dividend on similar Stock in the Company having been 12½ per cent.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the
HERNE BAY GAS COMPANY, LIMITED.

NEW ISSUE OF 1000 £5 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 7th of November, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.
TONBRIDGE GAS COMPANY.

£2000 "E" STOCK.
DIVIDEND UNDER SLIDING-SCALE 8½ PER CENT.

MESSRS. NEVE AND SON will Sell THE ABOVE BY AUCTION, at the Rose and Crown Hotel, Tonbridge, on Tuesday, Oct. 31, at Three p.m. precisely.

Particulars of the AUCTIONEERS, Bank Street, TONBRIDGE; or of JAMES DONALDSON, Secretary, Gas Company, TONBRIDGE.

WELLINGBOROUGH.

TO CAPITALISTS, INVESTORS, AND OTHERS.

600 £10 ORDINARY "C" SHARES
IN THE
WELLINGBOROUGH GASLIGHT COMPANY, LIMITED,

TO BE SOLD by Auction, by Messrs. PENDERED AND SON, at the Hind Hotel, Wellingborough, on Wednesday, the 25th day of October, 1899, at Five for Six o'clock in the Evening, in convenient Lots to suit Purchasers, pursuant to the "Wellingborough Gas Order, 1899."

N.B.—The Dividend paid for the last two Half Years on the £10 Shares of the Company has been at the rate of 9 per cent. per annum, free from Income-Tax. As the business of the Company is steadily increasing, and there is an ample Reserve Fund, it may be confidently anticipated that this Dividend will be maintained in the future.

There are no Preference Shares in the Company, and all the Shares rank for Dividend according to their relative nominal value.

Printed Particulars and Conditions of Sale may be obtained of the AUCTIONEERS, WELLINGBOROUGH; of Mr. S. H. KIMBELL, the Gas Company's Offices, COMMERCIAL PLACE; or of Messrs. SHARMAN, JACKSON, AND ARCHER, Solicitors, WELLINGBOROUGH.

MORECAMBE GAS AND LIGHT COMPANY.

TO be Sold by Auction, by Mr. G. H. PETTY, pursuant to Instructions of the Directors of the Morecambe Gas and Light Company, at the Company's Offices, Market Street, Morecambe, on Tuesday, the 7th day of November, 1899, at Three o'clock in the Afternoon prompt, subject to conditions to be then produced,

NEW ORDINARY STOCK

sufficient to produce, with the Premiums thereon, the sum of £10,000, being part of the amount of £16,000 authorized by the Morecambe Gas Order, 1899.

The Stock will rank for a Standard Dividend of 7 per cent., subject to the Sliding-Scale. For the Year ending the 30th of June last, the Ordinary Stock received a dividend of 4 per cent. above the Standard Dividend, and on the present Price of Gas a Dividend up to 5½ per cent. above the Standard Dividend may be paid if earned.

The Stock will be offered in lots of £100 each.

For Particulars apply to the Auctioneer, 62, Market Street, Lancaster; Mr. W. Duff, Secretary and Manager of the Morecambe Gas and Light Company; or to Messrs. Clark, Oglethorpe, and Sons, Solicitors, Lancaster and Morecambe.

By order of the Directors,
WILLIAM DUFF,
Secretary.

Market Street, Morecambe,
Oct. 5, 1899.

NITRATE of Thorium and Cerium. FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

THOMAS DUXBURY & CO.,
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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

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Available Output up to 5000 Tons per day.
Yield of Gas 11,000 cubic feet per Ton of Coal,
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OF THE

METROPOLITAN WATER COMPANIES

(Chelsea, East London, Grand Junction, Kent, Lambeth, New River, Southwark and Vauxhall, and West Middlesex)
AND OF THE
CORPORATION WATER UNDERTAKINGS
OF
EDINBURGH, GLASGOW, & MANCHESTER,
FOR THE YEAR 1898-1899.

Compiled and arranged by
LASS, WOOD, & DREW,
Chartered Accountants.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

THORNLEY GAS COALS

WORKED BY THE
WEARDALE IRON & COAL CO., LD.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the
WEARDALE IRON & COAL CO., LD.
QUAYSIDE, NEWCASTLE-ON-TYNE.

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FOR
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For use in the
RECOVERY OF SULPHUR,
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FOR GAS-FURNACES.

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These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16$\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality)	13$\frac{3}{4}$ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

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Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

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Manufacturers of Incandescent Burners.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per Ton. .	10,500 Cubic Feet.
Illuminating Power . .	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

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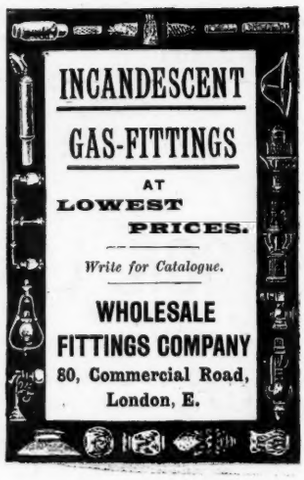

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Illuminating Power	38·22 candles
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Coke	70 per cent.

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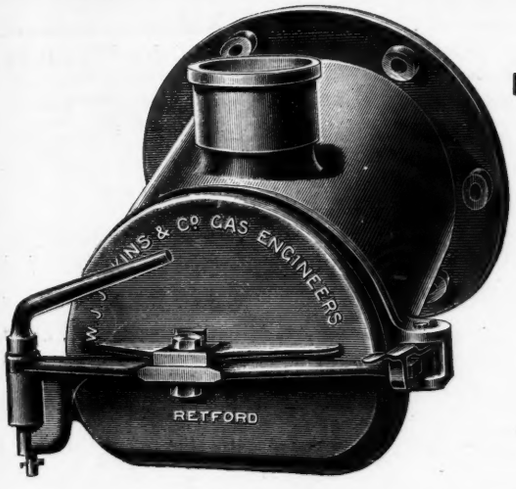

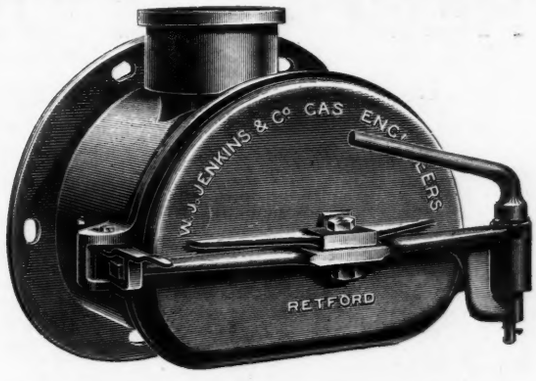

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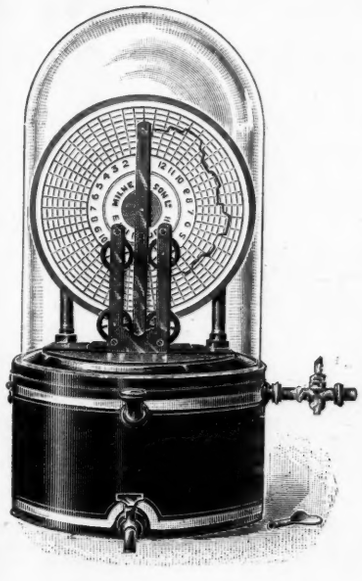

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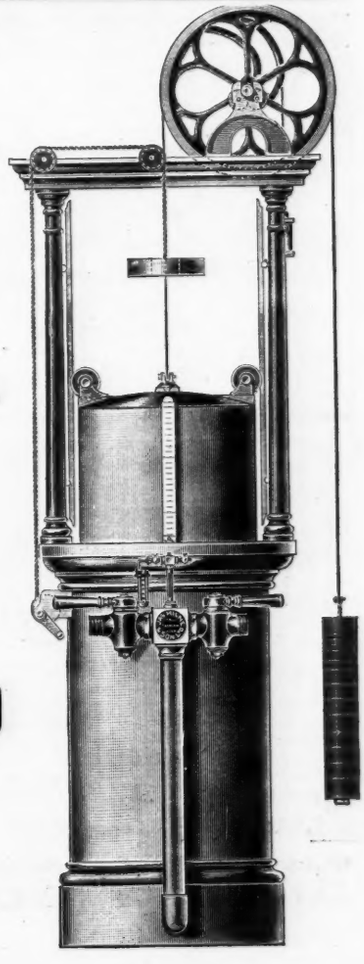

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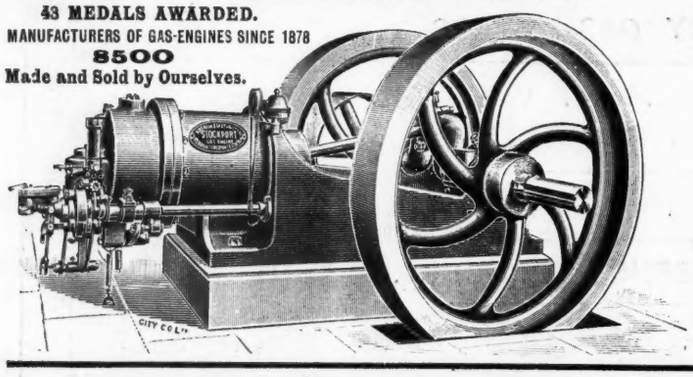

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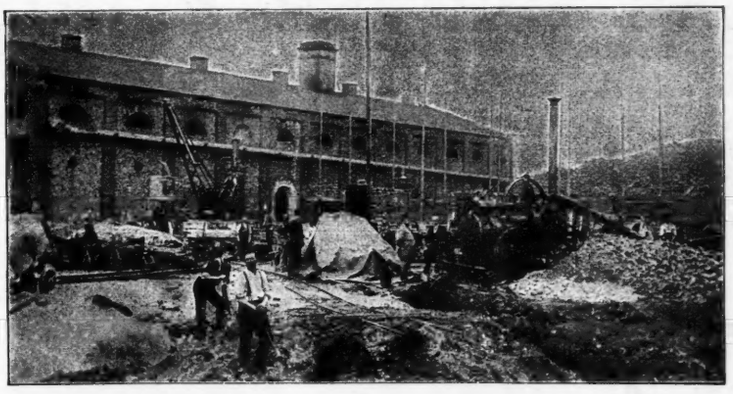

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The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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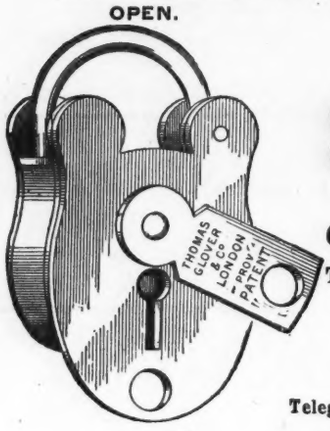

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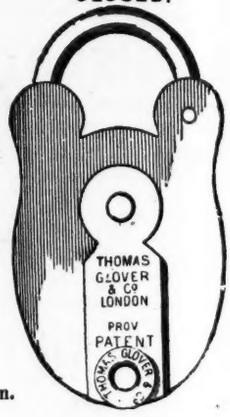

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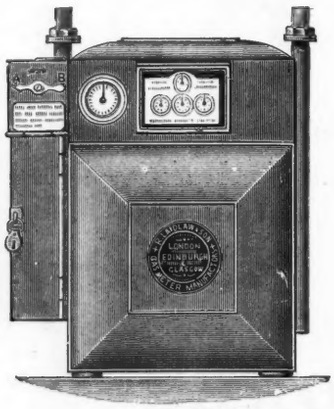
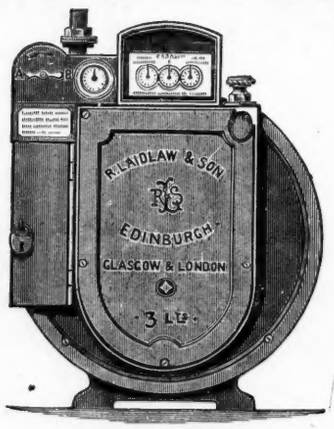


—DRY METER.—



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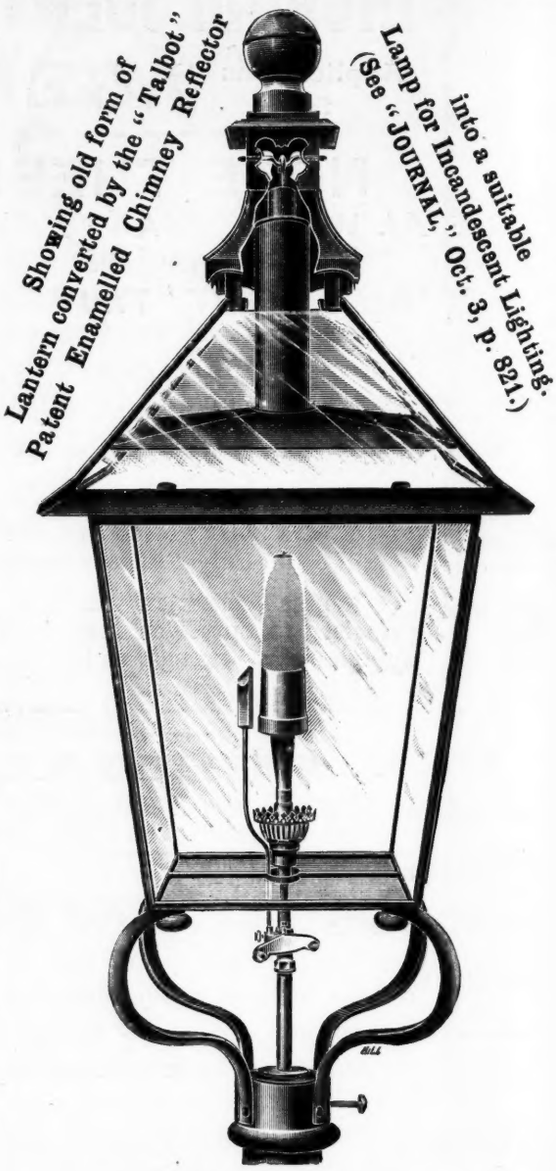
Showing old form of Lantern converted by the "Talbot" Patent Enamelled Chimney Reflector
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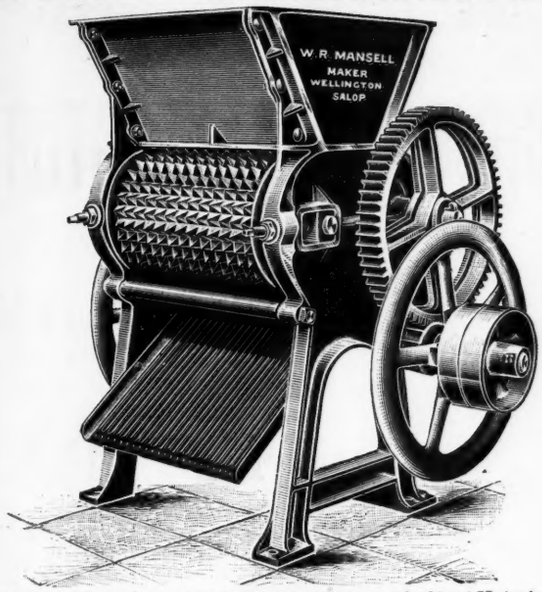

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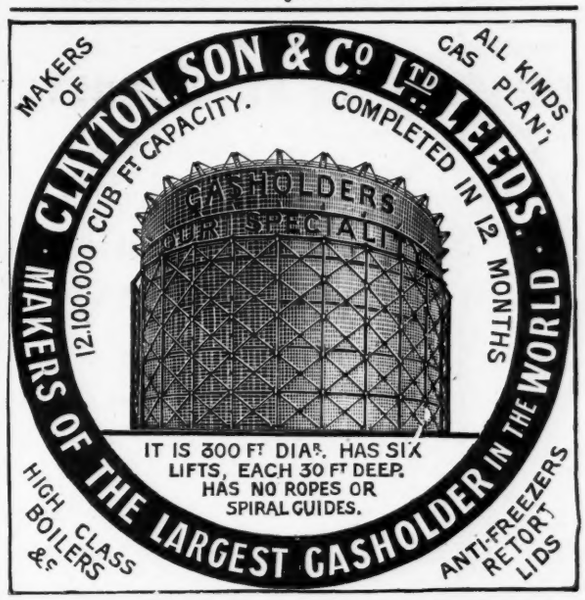
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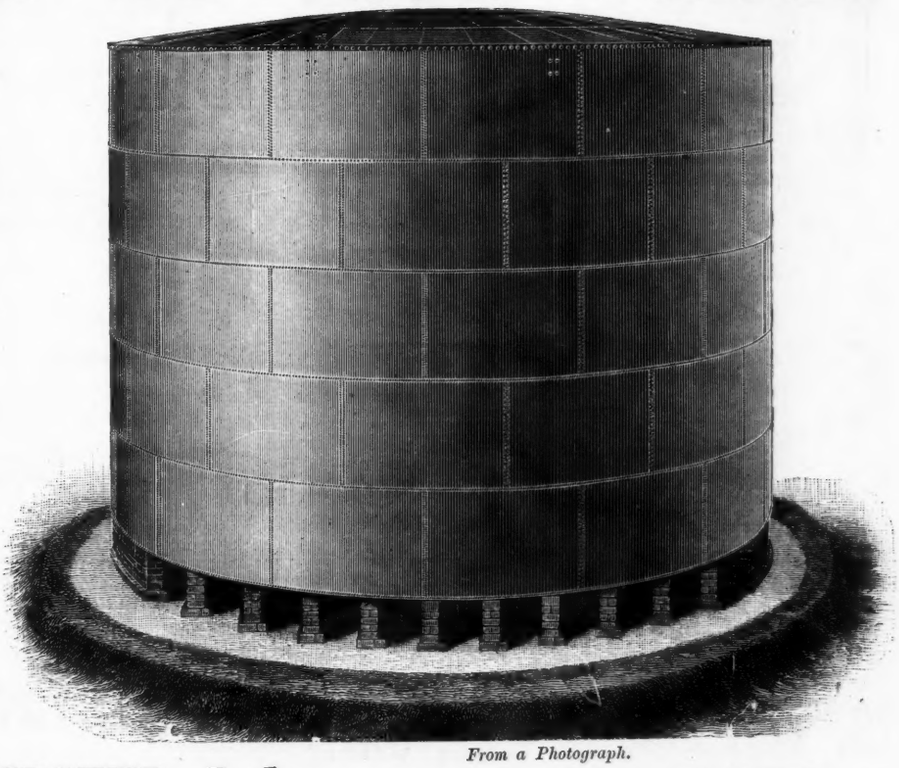

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[See also Advt. p. 926.

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